



CORK COUNTY COUNCIL
COMHAIRLE CONTAE CHORCAÍ

**RIVER BLACKWATER WWTW DISCHARGES –
DISCHARGE LICENCES
NATURA IMPACT STATEMENT**

JUNE 2011



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1 Introduction

1.1 Background

Ryan Hanley Consulting Engineers have been contracted by Cork County Council to carry out an assessment of the potential ecological impacts of the effluent discharging to the River Blackwater catchment from a series of WWTPs in North Cork and prepare a Natura Impact Statement (NIS). This NIS will subsequently be used to inform the Appropriate Assessment carried out by the Council. In total, 46 agglomerations discharge within the Blackwater catchment.

Applications for Waste Water Discharge Licences for 23 of these agglomerations have been submitted to the EPA by Cork County Council in accordance with the Waste Water Discharge (Authorisation) Regulations 2007 (SI 864 of 2007). Section F of the waste water discharge certificate application requires an assessment of the impacts of discharges on the existing environment.

The Blackwater discharges which require Discharge Licences are:

- Ballyclough (Ref: D0441-01)
- Ballyhooley (Ref: D0432-01)
- Banteer (Ref: D0448-01)
- Boherbue (Ref: D0437-01)
- Buttevant (Ref: D0303-01)
- Bweeng (Ref: D0438-01)
- Castlelyons (Ref: D0449-01)
- Castletownroche (Ref: D0293-01)
- Churchtown (Ref: D0444-01)
- Clondulane (Ref: D0450-01)
- Conna (Ref: D0439-01)
- Doneraile (Ref: D0300-01)
- Dromahane (Ref: D0302-01)
- Fermoy (Ref: D0058-01)
- Glanworth (Ref: D0445-01)
- Kanturk (Ref: D0203-01)
- Kildorrery (Ref: D0442-01)
- Killavullen (Ref: D0447-01)
- Kilworth (Ref: D0334-01)
- Mallow (Ref: D0052-01)
- Millstreet (Ref: D0332-01)
- Newmarket (Ref: D0333-01)
- Rathcormack (Ref: D0200-01)

Where such discharges occur within the catchment of a Natura 2000 site, EPA guidelines state that 'Initial Screening' be carried out in accordance with Appendix 1 of the Circular L8/08 entitled "Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments" issued by the Department of the Environment, Heritage and Local Government (DoEHLG) in 2008. Should the outcome of this screening process indicate that negative effects to any Natura site cannot be ruled out, a full 'Appropriate Assessment' is to be carried out. Further details on the various stages of Appropriate Assessment are included in Section 1.2.

The purpose of this report is to determine the ecological effects, if any, of the respective WWTPs being assessed for certification. The final objective is to assess if any such predicted impacts have the potential to have significant negative impacts on the qualifying interests or on the conservation objectives of the receiving Natura 2000 site.

1.2 Appropriate Assessment – Legislative Context

The EU Habitats Directive (*Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna*) contains a list of rare habitats and species (Annex I and II respectively); the conservation of these is considered to be of European and International importance. Similarly, the EU Birds Directive (*Council Directive 79/409/EC on the conservation of wild birds*) aims to protect specific bird species considered to be at risk. Member states have the responsibility to designate geographic sites according to their conservation value for the aforementioned habitats and species, namely Special Areas of Conservation and Special Protection Areas, which together form a network referred to as *Natura 2000*; see Section 1.2.

Paragraph 3 of Article 6 of the Habitats Directive state that:

6(3) *Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

Where such an assessment finds that all potential impacts cannot be successfully avoided or mitigated against, then Paragraph 4 of Article 6 is applied:

6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

The statutory agency responsible for Natura 2000 sites is the National Parks and Wildlife Service of the Department of Environment, Heritage and Local Government. The European Court of Justice has recently (December 13 2007) issued a judgment in a legal case against Ireland that found that Ireland has failed in its statutory duty to confer adequate protection on designated areas. Following on from this the Circular Letter 1/08 & NPWS 1/08 on Appropriate Assessment of Land Use Plans (from the Department of the Environment, Heritage and Local Government) states that all plans and projects will be subject to critical assessment to ensure that they comply with all relevant legislation.

AA is a focused and detailed impact assessment of the implications of the plan or project, alone and in combination with other plans and projects, on the integrity of a Natura 2000 site in view of its conservation objectives. The terms of AA have been worked out in judgments of the European Court of Justice. The case law has established that assessments should be undertaken on the basis of the best scientific evidence and methods. Accordingly, if the consent authority so requires, data and information on the project and on the site and an analysis of potential effects on the site must be obtained and presented in a **Natura Impact Statement** (NIS) which must be presented by the applicant.

Ecological specialists are generally engaged by applicants to undertake the surveys, research and analysis, with input from other experts (e.g. hydrologists or engineers) as necessary to prepare the NIS. In general, larger projects will entail a greater amount of scientific scrutiny. It is the responsibility of the applicant to have the NIS prepared for submission to the consent authority. Having satisfied itself that the Statement is complete and objective, the competent

authority carries out the AA on the basis of the NIS and any other appropriate sources of information. In the case of Waste Water Discharge Licensing, the Environmental Protection Agency is considered to be the competent authority.

There are 4 stages in an Appropriate Assessment as outlined in the European Commission Guidance document (2001). The following is a brief summary of these steps.

Stage 1 - Screening: This stage examines the likely effects of a project either alone or in combination with other projects upon a Natura 2000 Site and considers whether it can be objectively concluded that these effects will not be significant

Stage 2 - Appropriate Assessment: In this stage, the impact of the project on the integrity of the Natura 2000 site is considered with respect to the conservation objectives of the site and to its structure and function. The Appropriate Assessment is informed by the Natura Impact Statement.

Stage 3 - Assessment of Alternative Solutions: Should the Appropriate Assessment determine that adverse impacts are likely upon a Natura 2000 site, this stage examines alternative ways of implementing the project that, where possible, avoid these adverse impacts.

Stage 4 - Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the Natura site will be necessary.

1.3 Natura 2000 sites

There are two designations which form part of the Natura 2000 network of sites that require specific ecological protection in Ireland:

Special Areas of Conservation (SACs)

These are sites that have been identified to be of conservation importance in a European context, based on the habitats and species; both plant and animal; that they support. The Directive has a number of Annexes. Habitats listed on Annex I are those habitat types of community interest whose conservation requires the designation of Special Areas of Conservation. Some of these are known as priority habitats for which there is a particular obligation for protection. Animal and

plant species of community interest whose conservation requires the designation of Special Areas of Conservation are listed on Annex II of the Directive.

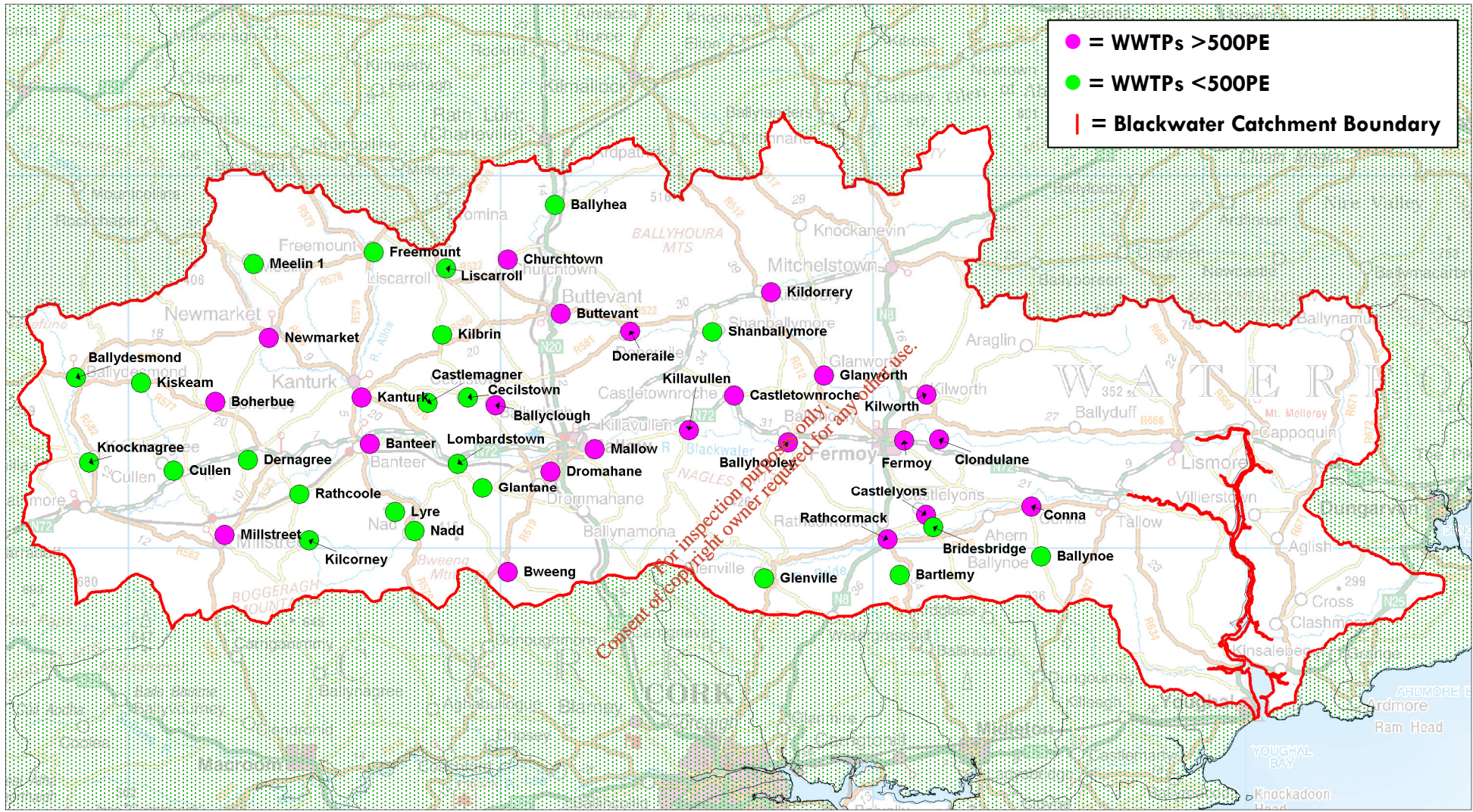
All SACs are also proposed Natural Heritage Areas. There is a list of Notifiable Actions which apply to each annexed habitat and species. These are activities for which consent must be sought from the Minister of Environment, Heritage and Local Government within SACs. SACs are protected under the Habitats Directive of 1992 (EU Directive 92/43/EEC) and the Natural Habitats Regulations of 1997 (S.I.94/97).

Special Protection Areas (SPAs)

These are sites of European importance that have been identified as being of conservation importance on account of the bird species and populations they support. The Directive directs all member states to take measures to protect all wild birds and to preserve a sufficient diversity of habitats for all species naturally occurring within their territories, so as to maintain populations. Species whose status is a cause for concern are specifically identified for special conservation measures in Annex I of the Directive, and SPAs have been designated based on either the presence of these species or the presence of significant numbers of wintering waterfowl. All SPAs are also proposed Natural Heritage Areas. SPAs are protected under the Birds Directive of 1979 (EU Directive 79/409/EEC) and the Natural Habitats Regulations of 1997 (S.I.94/97). A number of SPAs are located in the vicinity of the headwaters of the Blackwater and its tributaries; these however are associated with upland terrestrial habitats and will not be affected in any way by the respective WWTP discharges. The Blackwater Callows SPA occurs downstream of Fermoy and is considered as part of the Fermoy WWTP assessment.

1.4 Scheme locations

The geographic locations of the respective agglomerations are shown in Figure 1.1. While several other Natura 2000 sites are located within the region, this report only considers potential impacts which relate to the overall Blackwater catchment, the majority of the rivers of which form the Blackwater River (Cork/Waterford) candidate SAC. Also shown are the Cork WWTPs of under 500PE, which require Certificates of Authorisation; these have been assessed in a report submitted to Cork County Council in April 2011. Figure 1.2 shows the extent of the Blackwater River cSAC in relation to the respective WWTPs. These maps are reproduced in Appendix 27 in A3 format.



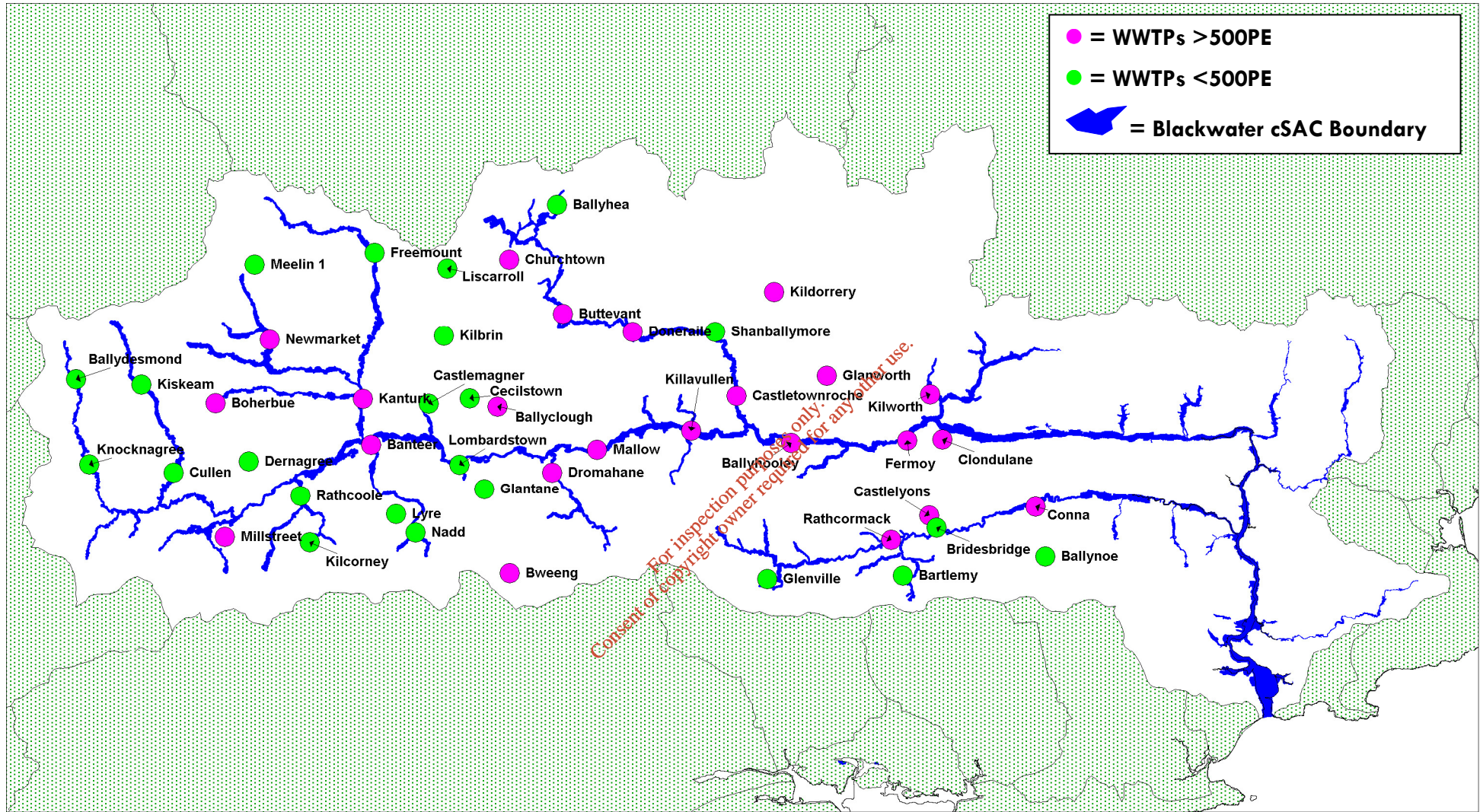
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Figure 1.1 - Geographic locations of Blackwater River WWTPs



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Figure 1.2 – Extent of Blackwater River cSAC

2 Methodology

2.1 Desk study

A desk study was carried out to collate the available information on the ecological environment. Water quality data from sampling points upstream and downstream of the respective discharges was gleaned from the Environmental Protection Agency website (www.epa.ie). The National Parks and Wildlife Service (NPWS) website (www.designatednatureareas.ie) was also queried in relation to areas and records of rare and protected species within the discharge receiving waters. Further information was collated from the Water Framework Directive website (www.wfdireland.ie). The licence application forms already submitted by Cork County Council were consulted, as was water sampling data supplied by Cork County Council, in relation to various water quality standards, where available for the respective discharges. Other environmental reports submitted in relation to plans or projects in the region were also reviewed. Key ecological reports for studies carried out in Cork and the wider Munster area were reviewed for applicable information relating to the distribution and ecology of the qualifying interests of the Blackwater River cSAC.

2.2 Consultation

A range of key stakeholders and other organisations with an interest in the Blackwater River were formally consulted during the assessment. These included:

- National Parks and Wildlife Service Regional Management
- DoEHLG Development Applications Unit
- Inland Fisheries Ireland
- South Western River Basin District Advisory Council
- Dr Evelyn Moorkens (Freshwater Pearl Mussel Specialist)
- Mr Eugene Ross (Freshwater Pearl Mussel Specialist)
- Teagasc
- Coillte
- Department of Agriculture
- Cork County Council Environmental Services Unit

To date, responses have been received from Inland Fisheries Ireland, Cork Co. Co. Environmental Services Unit and the Teagasc. NPWS Regional Staff were informally consulted. The IFI and Teagasc consultation response letters are reproduced in Appendix 26.

2.3 Field surveys

Site visits to the locations of the respective discharges were made by the Ryan Hanley Senior Ecologist on during May 2011 to document local conditions and potential impacts, if any.

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3 Assessment

The assessment of impacts associated with the respective WWTP discharges has been prepared in accordance with the following documents:

- Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007). Environmental Protection Agency. Wexford. 2009.
- Circular L8/08 Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. 2 September 2008.
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government. Dublin. 2009 (Revised March 2010)
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001
- Managing Natura 2000 Sites: The Provisions of Article 6 of the ‘Habitats Directive’ 92/43/EEC, European Commission, 2000

Details relating to the Blackwater River catchment are laid out in Section 4. For ease of reference and subsequent separation if necessary, screening and, where applicable, Natura Impact Assessments are laid out for each agglomeration in Appendices 2 through 24.

4 Description of the Blackwater River catchment

4.1 Background

The Blackwater River is the second largest river in Ireland after the Shannon, and is one of the most important features of the south-western landscape (Moriarty, 1998). The Blackwater or Munster Blackwater is the main river which flows through counties Kerry, Cork and Waterford. There are many peat bogs on the upper river, which give the river its distinctive peaty colour, and ultimately its name. The river rises at 460m in the Mullaghareirk Mountains in County Kerry and flows in an easterly direction through County Cork, through Mallow and Fermoy (Moriarty, 1998). The river then enters County Waterford for the final 35km of its journey, flowing through Lismore before turning abruptly south at Cappoquin and finally draining into the sea at Youghal.

In total, the Blackwater River is 120kms long and the total catchment area is 3,380 km² (Moriarty, 1998). The entire length of the catchment forms part of the Blackwater River (Cork/Waterford) candidate Special Area of Conservation (SAC) and it also incorporates part of the Galtee Mountains SAC.

The river has many tributaries, most draining from the northern side of the catchment, the largest being the Owentaraglin and Allula rising in the Mullaghareirk Mountains and the Awbeg and Funcheon rising from the Ballyhoura and Galtee mountains respectively. The Araglin rises in the Knockmealdown Mountains. The Finnow, Glen and Clyda drain the Boggeragh Mountains from the south. The Bride, Finisk and Licky complete the list of major tributaries (Moriarty, 1998).

The Blackwater River is notable for being one of the best salmon fishing rivers in the country. Sea Trout ascend the lower reaches and one of its tributaries, the Bride.

The catchment area of the Blackwater is largely rural and served by relatively small towns including Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal.

The upland parts of the catchment are open country or afforested. There are large tracts of plantation forestry on the Ballyhoura, Nagle, Boggeragh, Galtee, Knockmealdown and Kilworth Mountains. Lower down, the land use is primarily agricultural. Based on the Corine land cover data (obtained from aerial imagery <http://www.eea.europa.eu/publications/CORO-landcover>), the most common Corine land use type within the Munster-Blackwater is agricultural with

“pastures” accounting for (62.02%). “Peat bogs” make up (5.28%) together with “coniferous forest” (7.75%).

4.2 Blackwater River Special Area of Conservation

4.2.1 Details of site designation

The site designated as the Blackwater River cSAC consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond and as far downstream as the tidal stretches into Youghal Harbour as well as the many tributaries along the way, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The extent of the Blackwater and its tributaries in this site flows through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. The total river length within the cSAC is 449.26 km (NS2, 2010) and the designated site covers a total area of 15048.77 ha.

The site is of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively; as well as good examples of a range of marsh and wetland plant communities and assemblages. In addition, the Blackwater River is of conservation value for populations of bird species and two Special Protection Areas, designated under the E.U. Birds Directive, are located within the site, namely the Blackwater Callows and Blackwater Estuary.

The Blackwater River has been designated as a candidate Special Area of Conservation on the basis of the presence of extensive and good quality examples of ten habitats types listed in Annex I of the EU Habitats Directive (92/43/EEC May 1992), two of which are ‘priority Annex I’ habitats. These habitats are described in Table 4.1 below and the NPWS Site Synopsis is presented in Appendix 25. Note that taxonomy and nomenclature within the main text follow Stace (1997).

Table 4.1. Habitats of qualifying interest for the Blackwater River cSAC

HABITATS LISTED IN ANNEX I OF THE EU HABITATS DIRECTIVE	NOTES AND 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>)	‘Priority’ Annex I habitat. The site is rich in the presence of riparian alluvial forest and wet woodlands, forming one of the most extensive tracts of this habitat in the country. Wet woodlands are particularly notable on the River Bride and between Cappoquin and Youghal where the channel is lined by narrow

(EU Habitat Code 91E0)	woods of White and Almond Willow (<i>Salix alba</i> and <i>S. triandra</i>) with isolated Crack Willow (<i>S. fragilis</i>) and Osier (<i>S. viminalis</i>).
<i>Taxus baccata</i> woods of the British Isles (EU Habitat Code 91J0)	'Priority' Annex I habitat. A small stand of Yew (<i>Taxus baccata</i>) woodland, a rare habitat in Ireland and the EU, occurs within the site. This is on a limestone ridge at Dromana, near Villierstown in Co Waterford.
Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation (EU Code 3260)	Floating river vegetation is found along much of the freshwater stretches within the site. The species list is extensive and includes Pond Water-crowfoot (<i>Ranunculus peltatus</i>), Water-crowfoot (<i>Ranunculus</i> sp.), Canadian Waterweed (<i>Elodea canadensis</i>), Broad-leaved Pondweed (<i>Potamogeton natans</i>), Water Milfoil (<i>Myriophyllum</i> spp.), Common Club-rush (<i>Scirpus lacustris</i>), Water-starwort (<i>Callitriche</i> sp.) and Lesser Water-parsnip (<i>Berula erecta</i>).
Estuaries (EU Code 1130)	Found in the lower estuarine reaches of the site – the Blackwater River discharging into Youghal Harbour.
Mudflats and sandflats not covered by seawater at low tide (EU Code 1140)	The lower estuarine parts of the site has extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones. The best examples are the wide expanses on the eastern side (Co Waterford) known as Kinsalebeg, and the stretch between Youghal and the Youghal Bridge to the north on the Co Cork side which also encompasses the estuary of the Tourig River.
<i>Salicornia</i> and other annuals colonizing mud and sand (EU Code 1310)	The lower sections of the site (estuarine) contain examples of this habitat.
Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) (EU Code 1330)	The site has a few small areas of saltmarsh in the townlands of Foxhole and Blackbog. The species include list Common Saltmarsh-grass (<i>Puccinellia maritima</i>), Greater Sea-spurrey (<i>Spergularia media</i>), Glasswort (<i>Salicornia</i> sp.), Sea Arrowgrass (<i>Triglochin maritima</i>), Annual Sea-blite (<i>Suaeda maritima</i>) and Sea Purslane (<i>Halimione portulacoides</i>), Lavender (<i>Limonium</i> sp.), Thrift (<i>Armeria maritima</i>), Red Fescue (<i>Festuca rubra</i>), Common Scurvy-grass (<i>Cochlearia officinalis</i>) and Sea Plantain (<i>Plantago maritima</i>). Oraches (<i>Atriplex</i> sp.).
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (EU Code 1410)	The site has a few small areas of this saltmarsh.
Perennial vegetation of stony banks (EU Habitat Code 1220)	The shingle spit at Ferrypoint supports a good example of perennial vegetation of stony banks. At the lowest part, Sea Beet (<i>Beta vulgaris</i> subsp. <i>maritima</i>), Curled Dock, (<i>Rumex crispus</i>) and Yellow-horned Poppy (<i>Glaucium flavum</i>) occur as well as Sea Mayweed (<i>Tripleurospermum maritimum</i>), Cleavers (<i>Galium aparine</i>), Rock Samphire (<i>Crithmum maritimum</i>), Sandwort (<i>Honkenya peploides</i>), Spear-leaved Orache (<i>Atriplex prostrata</i>) with Babington's Orache (<i>A. glabruscula</i>) at a slightly higher level.
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (EU Habitat Code 91A0)	Oak woodland is well developed in the site in a number of locations including on sandstone near Ballinatray, with the acid Oak woodland community of Holly (<i>Ilex aquifolium</i>), Bilberry (<i>Vaccinium myrtillus</i>), Greater Woodrush (<i>Luzula sylvatica</i>) and Buckler Ferns (<i>Dryopteris affinis</i> , <i>D. aemula</i>) occurring in one place. Oak woodland is also found in Rincrew, Carrigane, Glendine, Newport and Dromana. Oak wood community in the Lismore and Glenmore valleys is of the classical upland type where Rowan (<i>Sorbus aucuparia</i>) and Downy Birch (<i>Betula pubescens</i>) occur.

Nine species listed under Annex II of the Habitats Directive form qualifying interests for the Blackwater River cSAC. These species are listed below and are discussed in more detail in Section 4.3. The NPWS Site Synopsis is presented in Appendix 25.

- Sea Lamprey (*Petromyzon marinus*)*
- River Lamprey (*Lampetra fluviatilis*)*
- Brook Lamprey (*Lampetra planeri*)*
- Twaité Shad (*Alosa fallax fallax*)*
- Salmon (*Salmo salar*)*
- Freshwater Pearl Mussel (*Margaritifera margaritifera*)*
- White-clawed Crayfish (*Austropotamobius pallipes*)*
- Otter (*Lutra lutra*)*
- Killarney Fern (*Trichomanes speciosum*)*

*represents species which are listed as 'species of special conservation significance within the County Cork Biodiversity Action Plan 2009-2013 (Cork County Council, 2009).

4.2.2 Conservation status of qualifying interest habitats species

The overriding **Conservation Objective** for Natura 2000 sites is the maintenance (or restoration) of 'favourable conservation status' of habitats and species. Site-specific conservation objectives for a Natura 2000 site should therefore define what constitutes favourable status for the habitats and species for which the site has been designated ('qualifying interests' or 'special conservation interests').

Currently there is no available Natura 2000 Management Plan outlining the Conservation Objectives for the Blackwater River cSAC (NPWS, pers. comm.). Generic objectives have been compiled for SAC and SPA sites based on a sites' qualifying interests and these are based on the concept of 'favourable conservation status' as defined by Articles 1(e) and 1 (i) of the EU Habitats Directive (see box).

Favourable Conservation Status as defined by Articles 1 (e) and 1(i) of the Habitats Directive

The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- its natural range and areas it covers within that range are stable or increasing; and
- the specific structure and functions which 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.

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- the population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- the natural range of the species is neither being reduced nor is 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.

Under Article 17 of the Habitats Directive, each member state is obliged to report to the European Commission on the status of listed habitats and species every six years. In December 2007, Ireland submitted the first baseline assessments of conservation status for all 59 habitats and c.100 species that occur in Ireland. Conservation status was assessed across the whole national territory (not just within SAC sites) and for habitats, is based on the parameters of Range, Area, Structure & Functions and Future Prospects, and for species is based on the parameters of Range, Population, Area of suitable habitat and Future Prospects. Results are published within 'The status of EU protected habitats and species in Ireland' (NPWS, 2008) and summarised in Table 4.2 for the habitats and species that form qualifying interests for the Blackwater River cSAC. Each parameter was classified as being "favourable" (good), "unfavourable – inadequate" (poor), "unfavourable – bad" (bad) or "unknown".

Table 4.2. Conservation status of qualifying interest habitats and species of the Blackwater River cSAC (2170) (after NPWS, 2008).

HABITATS & SPECIES OF QUALIFYING INTEREST ~ CONSERVATION STATUS (AS PER NPWS, 2008)					
HABITATS OF QUALIFYING INTEREST	RANGE	AREA	STRUCTURE & FUNCTION	FUTURE PROSPECTS	OVERALL
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (EU Habitat Code 91E0)	Good	Bad	Bad	Bad	Bad
<i>Taxus baccata</i> woods of the British Isles (EU Habitat Code 91J0)	Bad	Bad	Bad	Bad	Bad
Water courses of plain to montane levels with the <i>Ranuncion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (EU Code 3260)	Good	Good	Bad	Bad	Bad
Estuaries (EU Code 1130)	Good	Good	Unknown	Poor	Poor
Mudflats and sandflats not covered by seawater at low	Good	Good	Poor	Poor	Poor

tide (EU Code 1140)					
Salicornia and other annuals colonizing mud and sand (EU Code 1310)	Good	Poor	Poor	Poor	Poor
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (EU Code 1330)	Good	Poor	Poor	Poor	Poor
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (EU Code 1410)	Good	Good	Poor	Poor	Poor
Perennial vegetation of stony banks (EU Habitat Code 1220)	Good	Poor	Poor	Poor	Poor
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (EU Habitat Code 91A0)	Good	Bad	Bad	Bad	Bad
SPECIES OF QUALIFYING INTEREST	RANGE	POPULATION	HABITAT	FUTURE PROSPECTS	OVERALL
Sea Lamprey (<i>Petromyzon marinus</i>)	Poor	Poor	Poor	Poor	Poor
River Lamprey (<i>Lampetra fluviatilis</i>)	Good	Good	Good	Good	Good
Brook Lamprey (<i>Lampetra planeri</i>)	Good	Good	Good	Good	Good
Twaite Shad (<i>Alosa fallax fallax</i>)	Good	Bad	Unknown	Poor	Bad
Salmon (<i>Salmo salar</i>)	Good	Bad	Poor	Poor	Bad
Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>)	Good	Bad	Bad	Bad	Bad
White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	Poor	Poor	Poor	Poor	Poor
Otter (<i>Lutra lutra</i>)	Good	Poor	Good	Good	Poor
Killarney Fern (<i>Trichomanes speciosum</i>)	Good	Good	Good	Good	Good

4.2.3 Additional habitats and species of conservation interest

In addition to the habitats of qualifying interest, the SAC site synopsis refers to additional habitats of conservation interest. These are listed below, classified as per Fossitt (2000):-

- Wet Willow-Alder-Ash-woodland (WN6)
- Marsh (GM1)
- Reed and large sedge swamp (FS1)
- Wet grassland (GS4)
- Wet heath (HH3)
- Lowland Blanket Bog (PB3)
- Semi-natural woodland (WN) and highly modified/non-native woodland (WD).

Marsh, reedbeds, lowland blanket bog and semi-natural woodland are listed as habitats of special conservation significance within the County Cork Biodiversity Action Plan 2009-2013 (Cork County Council, 2009).

In addition to the species of qualifying interest, the SAC site synopsis refers to additional species of conservation interest. These include five plant species listed in the Red data Book that have been recorded within the site - Starved Wood Sedge (*Carex depauperata*), Pennyroyal (*Mentha*

pulegium), Golden Dock (*Rumex maritimus*), Bird Cherry (*Prunus padus*) and Bird's-nest orchid (*Neottia nidus-avid*). Starved Wood Sedge and Pennyroyal are also listed on the Flora Protection Order, 1999.

The site also supports a range of mammal species listed in the Irish Red Data Book, including Pine Marten (*Martes martes*), Badger (*Meles meles*) and Irish Hare (*Lepus timidus hibernicus*). These are all protected species under the Wildlife Act 1976 & Wildlife (Amendment) Act, 2000, the principal national legislation relating to wildlife protection. All three species are listed in Appendix III of the Bern Convention¹.

Bat species including Natterer's Bat (*Myotis nattereri*), Daubenton's Bat (*Myotis daubentoni*), Whiskered Bat (*Myotis mystacinus*), Brown Long-eared Bat (*Plecotus auritus*) and Pipistrelle (*Pipistrellus* sp.) have all been recorded feeding along the river and/or roosting under old bridges. All of these bat species are afforded protection under the Wildlife Act 1976 & Wildlife (Amendment) Act, 2000, Annex IV of the EU Habitats Directive, and are listed in Appendix II of the Bern Convention and in Appendix II of the Bonn Convention².

Common Frog (*Rana temporaria*), a Red Data Book species that is legally protected (Wildlife Act 1976 & Wildlife (Amendment) Act, 2000), occurs throughout the site. The rare bush cricket, *Metriopectera rosellii* has also been recorded in reed/willow vegetation of the Lower Blackwater River. The Swan Mussel (*Anodonta cygnea*), a scarce species nationally, also occurs at a few sites along the freshwater stretches of the Blackwater River.

Several bird species listed on Annex I of the E.U. Birds Directive are found within the designated site (for a full list of the bird species listed for the site, please refer to the site synopsis in Appendix 25). The protection and conservation of wintering waterbird species are considered in two complementary designations of the Blackwater River i.e. the Blackwater Callows SPA (Site Code 4094) and Blackwater Estuary SPA (Site Code 4028).

Of note is the occurrence of the Annex I species Kingfisher *Alcedo atthis* along the Blackwater River. The piscivorous Kingfisher is primarily a freshwater aquatic bird species and favours lowland slow-flowing rivers. To date, no sites in Ireland have been formally designated for the Kingfisher. This issue was raised in a recent European Court of Justice ruling against Ireland (December 2007) and it seems likely that any future designations for Kingfisher may include the

¹ Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979.

² Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979.

Blackwater River – this river being included in recent waterway bird projects (e.g. Crowe et al. 2008; Cummins et al. 2010). These recent survey results suggest a slight decline in the density of Kingfisher territories along the Blackwater; from 0.06-0.07 in 2008 to 0.05 in 2010. Furthermore no territories were recorded along the Awbeg in 2010 which contrasts with previous observations (Crowe et al. 2010).

4.3 Further notes on the species of conservation interest

4.3.1 Salmonids

The Blackwater River gets one of the biggest Salmon runs of any Irish river, with perhaps the exception of the Moy. The main channel of the Blackwater is a designated Salmonid river¹ and Salmon are fished mostly on this main channel whilst Brown Trout (*Salmo trutta*) are fished on the main channel and on larger tributaries. Sea Trout are important on the River Bride and on the main channel upstream as far as Lismore.

The Blackwater is also noted for its coarse fish, particularly the cyprinids Roach (*Rutilus rutilus*) and Dace (*Leuciscus leuciscus*). Other fish in the system include European Eel (*Anguilla anguilla*), Perch (*Perca fluviatilis*) and Gudgeon (*Gobio gobio*) (Moriarty, 1998).

There are very few fishing clubs on the river and only a couple of those have Salmon fishing rights. The Salmon fishing is nearly all private and let by the fishery owners.

A decline in Salmon stocks is well recognised in Ireland and throughout the range of the North Atlantic Salmon (*Salmo salar*) and is attributed to several factors including the salmon disease Ulcerative Dermal Necrosis (UDN), poor marine survival and some overfishing (NPWS 2007a). In response to this, a 'Salmon Management Task Force' was established by the Minister for the Marine and Natural Resources in 1996 to review the management of Irish salmon stocks. Currently, various data are analysed annually by the Standing Scientific Committee (SSC) of the National Salmon Commission to provide an estimate of the status of salmon stocks in each of the designated 148 Irish salmon rivers. An estimate of spawning salmon is compared to the individual

¹ EU Freshwater Fish Directive (78/659/EC) transposed by S.I/ 293/1988 – European Communities (Quality of salmonid waters) Regulations, 1988.

salmon conservation limit (CL) for each river to determine if it is above or below CL.¹ The most recent assessment shows that the Blackwater River is meeting its Conservation Limit with the exception of one tributary, the Bride (Anon, 2007; NPWS, 2007a).

NPWS (2007a) collated habitat impact information for the 148 designated Salmonid rivers. They suggest that agricultural enrichment, forestry related pressures and poor water quality resulting from inadequate sewage treatment are the major pressures affecting Irish salmon rivers. The following pressures are considered to act upon the Blackwater River: agricultural enrichment, afforestation, artificial barriers/fish pass, flash flooding/excessive substrate displacement, overgrazing/bank trampling and quarrying/suspended solids run-off, together with inadequate sewage treatment (River Bride) (NPWS, 2007a).

4.3.2 Otter

The Eurasian Otter (*Lutra lutra*) is widespread throughout all Irish freshwater and most coastal habitats (Chapman & Chapman, 1981). It is an aquatic predator and in freshwater areas the diet typically comprises stickleback, salmonids, frogs, and eels (Bailey & Rochford, 2006).

Ireland is considered a stronghold for Otters as dramatic declines occurred in many European otter populations during the latter half of the 20th Century (largely attributed to hunting), and otters remain threatened, declining, rare, or extinct in many European countries. This trend however, is reversing in many countries due to recent conservation efforts.

The Eurasian Otter is protected under international (Habitats Directive) and national (Wildlife Act, 1976 and Wildlife Amendment Act, 2000) legislation. It is listed as a strictly protected species under Appendix II of the Bern Convention (Council of Europe, 1979) and is listed on Appendix 1 of CITES (1979).

The first systematic survey of otter distribution in Ireland was carried out between January 1980 and February 1981 (Chapman and Chapman, 1982). This was followed by a partial re-survey in 1990/91 (Lunnon & Reynolds, 1991) and a full national survey from August 2004 to August 2005 (Bailey & Rochford, 2006). Between the first national survey in 1980/81 and the most recent survey in 2004/05, a net population loss of 23.7% (- 0.98% p.a.) has been estimated,

¹ A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as “the spawning stock level that produces long term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship”.

with the majority of this decline occurring in the first ten years (Bailey & Rochford, 2006). This has led to the parameter of population and overall status of Otters being classified as Unfavourable – Inadequate in the NPWS Conservation Assessment (NPWS, 2007c).

The Blackwater River is considered one of the most important SAC sites in Ireland for Otters. Results from the most recent national survey found that 78% of sites surveyed within the SAC recorded the presence of Otters.

As Otters are aquatic animals, their conservation status is dependent largely on the status of the freshwater environment. NPWS (2007c) lists 28 threats and pressures which may impact upon Otters with habitat destruction and water pollution considered the most significant across Europe.

Otters of the Araglin River, a 29km tributary of the Blackwater River, were the subject of intense study (Ottino & Giller, 2004) as part of the River Araglin Catchment Study that commenced in 1990 and focused on the influence of catchment afforestation on water quality and ecology (e.g. Giller et al. 1997).

4.3.3 White-clawed Crayfish

Austropotamobius pallipes is the only freshwater crayfish species that occurs in Ireland (Demers et al. 2005). It is protected under international (Habitats Directive) and national (Wildlife Act, 1976 and Wildlife Amendment Act, 2000) legislation.

The White-clawed Crayfish can inhabit larger rivers but also smaller streams as well as lakes and canals. The species is widespread in the midlands and is associated with areas where the geology is predominantly limestone (Lucey & McGarringle, 1987).

The current range of White-clawed Crayfish in Ireland spans most of the Irish lowlands overlying either Palaeozoic limestone rock or lime-rich glacial deposits. It extends from South Donegal and the north midlands (Erne system) to Limerick, Cork and Waterford (Maugue, Awbeg and Suir systems), and from the Corrib in the west to the Boyne and Liffey systems in the east. Crayfish are absent from acid Palaeozoic rocks, as in Wicklow, Kerry, Connemara and west Donegal, as well as from most of Northern Ireland.

With regards the Blackwater River, the species is only known from the Awbeg where it was recorded at six sites in the 1960's (Toner & O'Connell, 1970). Surveys undertaken between 1990

and 2003 also confirmed a population of White-clawed Crayfish in the Awbeg (Demers et al. 2005). More recent assessments confirmed the species' presence and breeding evidence in the Awbeg but reported the species at one locality only, Buttevant. This is currently the only known location of this species in County Cork. However, a survey in 2009, did not record the species and the current status of the species is unknown (SWRBD, 2010a).

An overall decrease in the species' range, some 13% from previous assessments, has led to an overall range assessment of unfavourable (inadequate) in the NPWS Conservation Assessment (Reynolds, 2007).

White-clawed Crayfish require moderate to good water quality (Q3 or higher), slow to moderate current and a heterogeneous habitat with different types of shelter (Reynolds, 2007 and references therein). As crayfish do not migrate to breed, the habitat used by adult and juvenile crayfish for foraging, shelter and breeding is considered to be identical.

While the species is relatively tolerant of less than pristine water quality (Gallagher et al. 2005), population disappearances have been documented in systems where quality has deteriorated from Q3-4 to Q3. The habitats and conditions used by the White-clawed Crayfish are (after Reynolds, 2007):

- Stream bank, suitable for burrowing;
- Tree-roots;
- Cobble and stones;
- Aquatic vegetation, particularly *Fontinalis antipyretica*, *Rorippa nasturtiumaquaticum* and *Apium nodiflorum* in streams, and charophytes in lakes;
- Water quality of Q3 and above, pH generally 7.0 and above, adequate lime, and cool temperature (below 20°C).

Pressures upon the White-clawed Crayfish include declines in water quality (particularly discharges from industry or waste water treatment plants), loss of habitat quality, angling and leisure-related disturbances, introduced (alien) species and disease (Reynolds, 2007). The last two pressures on this list are linked because some of the observed declines in White-clawed Crayfish distribution are attributed to outbreaks of the crayfish plague which was brought about by the disease being introduced alongside a non-native crayfish species (Demers et al. 2005).

4.3.4 Lamprey species

Lampreys are Ireland's most primitive freshwater fish species, belonging to a group of vertebrates known as the Agnatha ('jawless fish'). Three taxa of lamprey are recognised in Ireland – the Sea Lamprey (*Petromyzon marinus* L.), the River Lamprey (*Lampetra fluviatilis* L.) and the Brook Lamprey (*Lampetra planeri* Bloch). There is uncertainty about the genetic relationship between the Brook and River Lamprey so the two are usually considered together despite their differing management requirements (NPWS, 2007d).

Sea and River Lampreys show many similarities in their life cycles, spending their adult life at sea or in the lower reaches of estuaries and ascending to freshwater to spawn (Igoe et al. 2004). The marine phase may last up to several years. The Sea Lamprey spawning migration commences in early summer and spawning occurs from May to early August. The River Lamprey has two periods of migration (autumn and spring) with spawning in April (NPWS, 2007d). Adults of both taxa excavate nests in gravel into which eggs are washed once they have been fertilised. After hatching, the young larvae swim or are washed downstream by the current to areas of fine sediment in still water, where they burrow. They live as filter feeders and can remain in fine sediment habitat for several years before transforming into young adult fish (NPWS, 2007d).

The distribution of Lamprey species in the Blackwater River cSAC is detailed in King & Linnane (2004). Good numbers of juvenile lamprey were recorded and of the 18 sites fished on the main river, only two contained no juveniles. The majority recorded were River/Brook Lamprey but juvenile Sea Lamprey were also recorded in many of the channels, including the main Blackwater channel making up approximately one-sixth of the overall recorded population across the catchment.

Juvenile River/Brook and Sea Lamprey were recorded from the main Blackwater channel and from the following rivers: Licky, Bride, Araglin, Clyda, Allow, Owenkeal, Finnow, Owentaraglin, Awanaskirtaun River, Crooked River and Awbeg 2. The following watercourses recorded only River/Brook Lamprey with no Sea Lamprey: Greagagh, Finisk, Glenshalane, Awbeg, Lyre, Dalua, Mocollop Glen, Duvglasha, Awbeg 2 and Breedog Rivers.

During a Sea Lamprey spawning investigation, a total of 65 redds were counted along a stretch between Mallow and Cappoquin. A single redd was recorded opposite Mallow Castle, 7 downstream of Killavullen and 3 downstream of Ballyhooly. The majority of Sea Lamprey spawning sites were observed downstream of Fermoy Bridge and weir with a further 18 redds observed in small clusters between Careysville and Cappoquin. Juvenile Sea Lampreys were

more widespread in the Blackwater compared with other rivers studied (NPWS, 2007d). The only River Lamprey spawning site encountered was at Rathcormack Bridge (River Bride).

Important requirements for the successful spawning of anadromous lamprey are unimpeded access from the sea through the estuarine and tidal areas and up rivers to the spawning grounds, and suitable gravelled areas for redd construction. It therefore follows that major pressures upon the species relate to factors that might impede their migration or modify/disturb their spawning habitat. NPWS (2007d) discuss various pressures and threats upon lamprey species. In particular, obstructions to passage such as weirs, impact upon Sea Lamprey (Igoe et al. 2004). It is apparent that Sea Lamprey can, at least in some years, ascend the weirs and other physical obstructions on the Blackwater in sufficient numbers to permit upstream dispersal prior to spawning (NPWS, 2007d).

Water quality and eutrophication are not considered to be highly significant pressures upon lamprey species although specific pollutants can cause mortality (NPWS, 2007d).

4.3.5 Twaite Shad

Three taxa of shad are recognised in Ireland – the Allis Shad (*Alosa alosa* L.), the Twaite Shad (*Alosa fallax* Lacepede) and the landlocked Killarney shad (*Alosa fallax killarnensis* Regan). These fish are members of the Herring family – Clupeidae. They are protected under Annex II and V of the EU Habitats Directive and are listed in Appendix III of the Bern Convention.

The Twaite and Allis Shad show many similarities in their life cycles, spending their adult life at sea or in the lower reaches of estuaries and ascending to fresh water to spawn in early summer.

Until relatively recently, little scientific research had been undertaken on the marine and migratory phases of Twaite and Allis Shad in Ireland. Doherty et al. (2004) reported that the only known spawning population of Twaite Shad occurred in the River Barrow. NPWS (2007e) provide a summary of previous records including those from the Central Fisheries Board (CFB) and Southern Regional Fisheries Board (SRFB) who confirmed the presence of Twaite Shad in the Munster Blackwater, River Barrow and River Suir during the period 1999-2000. In 2003, NPWS commissioned CFB to undertake investigations on the Slaney and Munster Blackwater to assess the use of each SAC by shad and lamprey. Results published in King & Linnane (2004) confirm the presence of Twaite Shad in the Blackwater, of significance were 16 caught in floating drift nets at Brian's Cúl on the Broads of Clashmore.

Currently, the only well known spawning site for the Twaité Shad is at St. Mullins on the Barrow. However, the fact that some of the Blackwater shad were juveniles of the 2+ age group suggests successful spawning may occur in some years. Cappoquin is the likely spawning area (NPWS, 2007e).

One of the most significant pressures upon shad species is the restricted access to spawning grounds as a result of man-made barriers to migration. This is thought to have impacted on shad populations throughout Europe (NPWS, 2007e). Doherty et al. (2004) suggest that impacts upon the species include water quality, including eutrophication, as well as habitat deterioration. King & Linnane (2004) discuss the following pressures in relation to the Blackwater River:

- by-catch from commercial fisheries (i.e. unintentional catches during fishing for other species such as Salmon);
- obstruction of up-stream migration and likely obstruction by the Careysville weir;
- impacts upon water quality – thought not to be overriding factor in determining current status in these estuaries.

4.3.6 Killarney Fern

Trichomanes speciosum Willd (Killarney Fern) is a large filmy fern in the family Hymenophyllaceae.

T. speciosum has a typical fern 2-stage life cycle, the second “fern” like stage is known as the sporophyte and the first stage the gametophyte. Both the sporophyte and gametophyte stages are capable of asexual reproduction by mean of rhizomes (in the former) and gemmae (in the latter). In Ireland the sporophyte and gametophyte can occur together and can occupy similar habitats such as dripping caves, cliffs, crevices and gullies by waterfalls, crevices in woodland, and occasionally the floor of damp woodland; all deeply shaded humid habitats (Ratcliffe et. al 1993).

The Killarney Fern is protected under Annex II and V of the EU Habitats Directive and is listed on the Flora Protection Order, 1999.

The range of the Killarney Fern in Ireland is centred on the extreme south in Kerry and West Cork. There are restricted sites in Carlow, Clare, Donegal, Limerick, Waterford, Wicklow and

Sligo (Curtis & McGough 1998). The gametophyte range is similar but is more widespread and occurs in counties Galway and Mayo (Preston et al. 2002).

At present there are at least 65 populations of *Trichomanes speciosum* in Ireland, of which at least 39 of these are protected within pNHA or SAC sites. Monitoring of colonies in Ireland by Ratcliffe et al (1993) suggests there is a reasonable level of stability over a ten to thirty-year period in the number of fronds found in each colony and their position within the habitat. The conservation status of *Trichomanes speciosum* in Ireland is Favourable (NPWS, 2007f).

NPWS (2007f) give location and population estimates for *Trichomanes speciosum* in Ireland. For the Blackwater River, one record is given for Co Waterford from 2001 (grid square X08).

Pressures and threats upon the species are reviewed in NPWS (2007f). These include: water pollution, disturbance, woodland clearance, overgrazing and climate change.

4.3.7 Freshwater Pearl Mussel

The Freshwater Pearl Mussel is a bivalve mollusc. Populations of *Margaritifera margaritifera* are known from North America, northern and central Europe and Russia. The species is declining throughout its range and is listed in the IUCN red data book (Ver 2.3) as endangered worldwide. In Ireland the species is protected under international legislation (EU Habitats Directive Annex II and V) and the primary national legislation (Wildlife Acts 1976 and Wildlife Amendment Act, 2000). The species is also listed under Appendix III of the Bern Convention.

The Freshwater Pearl Mussel lives in oligotrophic, acid to neutral waters of rivers flowing over granite or sandstone rock, mainly in the western part of Ireland, but also in areas of the south and south east where geological conditions allow. The adult Pearl Mussel burrows to two-thirds of its shell depth, and is almost sessile in nature. As a filter feeder, large quantities of water are pumped through the animal's siphons and food particles are trapped and passed to the mussel's mouth.

The ecology of the species is particularly notable in that individuals can grow to very large sizes relative to other freshwater molluscs, building up thick calcareous valves in rivers which have soft water with low levels of calcium. Shell building is very slow and individuals can live to over a hundred years of age (NPWS, 2007b).

Members of the Pearl Mussel family, Margaritiferidae, have a complex life cycle. This is summarised in NPWS (2007b) and references therein. The presence of sufficient salmonid fish to act as temporary hosts of the larval glochidial stage of the Pearl Mussel life cycle is essential. In Ireland, Pearl Mussel rivers are either currently or historically important for migratory salmonids. Irish Pearl Mussels also encyst on resident brown trout (Moorkens 1999).

Margaritifera margaritifera is restricted to near natural, clean flowing waters, often downstream of ultra-oligotrophic lakes. It requires a stable cobble and gravel substrate with very little fine material below pea-sized gravel. Adult mussels are two-thirds buried and juveniles up to 5-10 years old are buried totally within the substrate. The lack of fine material (e.g. silt) in the river bed allows for free water exchange and hence oxygen exchange between the open water and water within the substrate interstices. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels. As a consequence, the substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. The open water must also be of high quality with very low nutrient concentrations in order to limit algal and macrophyte growth. Table 4.3 shows the habitat attributes, with ecological quality objectives for Pearl Mussel sites as set out in the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S. I. No 296 of 2009).

Table 4.3. Ecological quality objectives for freshwater Pearl Mussel (as per draft European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009.

Element	Objective	Notes
Macroinvertebrates	EQR \geq 0.90	High status
Filamentous algae (macroalgae)	Trace or Present (<5%)	Any filamentous algae should be wispy and ephemeral and never form mats
Phytobenthos (microalgae)	EQR \geq 0.93	High status
Macrophytes	Trace or Present (<5%)	Rooted macrophytes should be absent or rare within the mussel habitat.
Siltation	No artificially elevated levels of siltation	No plumes of silt when substratum is disturbed

NPWS (2007b) reported that there were 93 remaining populations of *Margaritifera margaritifera* in Ireland, of which none were considered viable (i.e. reproducing). NS2 (2010) report that 'only one of the 96 populations in the country is considered to be in favourable conservation status, as in the others, population reproduction and juvenile survival is not matching adult mortality rates and numbers are declining annually.'

The Munster Blackwater catchment is the largest Pearl Mussel catchment in Ireland encompassing 2333.83 km² in the south west of the country (South Western RBD). The species is recorded from the Blackwater main channel, the River Allow and the River Licky. The distribution is shown in Figure 4.1 below.

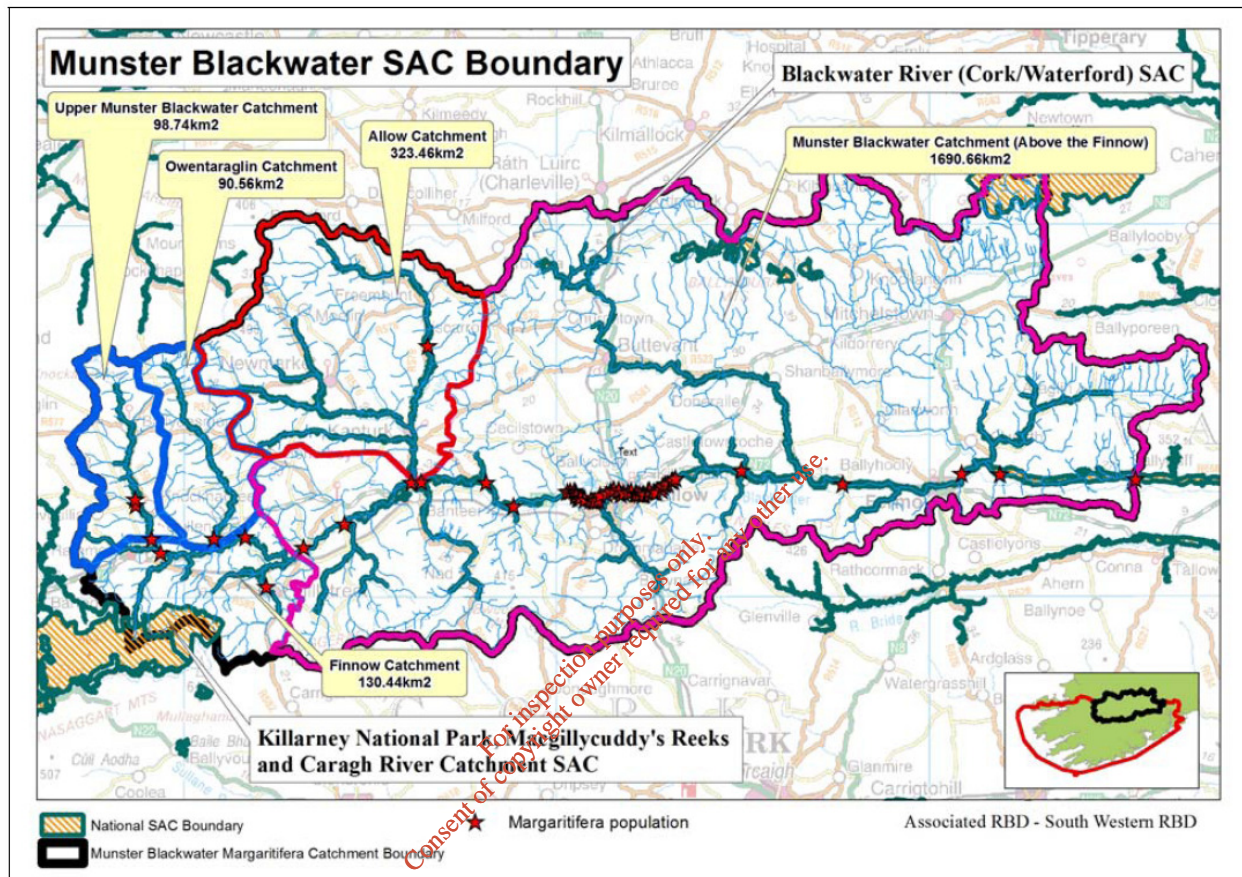


Figure 4.1 – Locations of Freshwater pearl mussel populations in Blackwater River catchment

NS2 (2010) present an account of the status of the Freshwater Pearl Mussel in the Blackwater catchment. Historical information is mostly derived from single records and shells lodged in museum collections. The earliest records come from the early 20th century, near Mallow and from Fermoy. Across the years there has been many records from targeted surveys carried out by e.g. NPWS/EPA staff, plus casual records of sightings sent to NPWS by conservation rangers, anglers, fisheries officers etc. However, there has been no detailed or systematic survey carried out on the Munster Blackwater Pearl Mussel population. Surveys carried out in the past five years and summarized in NS2 (2010) are as follows:-

- A survey by Moorkens in 2004 in the Clyda area, 2 km upstream of Mallow yielded two living mussels and 300 dead shells from 500m of river. Siltation of the mussels caused by instream works was believed to be the cause of the mussel kill.
- Between 1997 and 2005, NPWS staff surveyed tributaries of the Munster Blackwater: Glenlara River, Brogeen River, Dalua River, Owenbaun, Glen River, Nadd River, Awanaskirtaun River, Finnow River, Rathcool River, Corrigduff/Ivale River, Grinaloo River, Glashawee River, Owenkeal, Cregg Stream, Ross River, Clyda River, Duvglasha River, Glen River, Rahan Stream, Ogeen River and the River Bride; and recorded no mussels.
- In September 2008, Moorkens surveyed a short c.250m section of the Blackwater River upstream of Keale Bridge (W29560 93554). A small number of adult mussels were found: 14 mussels were found on the south bank in gravels under willows between W29404 93538 and W29296 93506. Another 17 were seen in similar habitat on north bank between the same grid references.
- A Stage 1 (presence/absence) non-continuous survey of the Pearl Mussel was carried out in the Blackwater River in September 2008 by Ecoserve, from approximately 6 km upstream to 6 km downstream of Mallow, Co. Cork. Mussels were found at 19 of the 38 examined locations. The mussel was found at every site examined upstream of Mallow town, in some places in relatively high density. Downstream of Mallow town, *M. margaritifera* was recorded from only one station. At a location along the north bank of the river adjacent of the Sugar Factory, an estimated density of up to 50-60 individuals per m² was found beneath overhanging trees.
- Three sites in the upper catchment surveyed by Ross in August 2009 recorded no evidence of mussels.

Whilst this information suggests that Pearl Mussels may still be relatively widespread in the Blackwater, and with small localised areas with moderately high densities, numbers are known to have declined, and the population is composed entirely of aged adults with no evidence of recruitment for at least 20 years (NS2, 2010). A condition assessment of the Blackwater River and Licky undertaken by NPWS (2007b) for the attributes 'population' and 'water quality', resulted in a 'Fail' for both attributes, while the Allow resulted in a 'data deficient' and 'fail' for the two attributes respectively. More recently, NS2 (2010) report a poor (unfavourable) conservation status for the Blackwater catchment.

A large number of activities and factors at catchment level may impact directly upon Pearl Mussels or indirectly on its habitat. These include pollution incidents, diffuse pollution including from agriculture, forestry, road building, drainage, river bank and bed erosion and modification, water abstraction, the introduction of exotic species, salmonid stocks, climate change, domestic septic tanks and malpractice in the storage and application of slurries (NPWS, 2008). Although pearl fishing was once a major threat it is now only permissible under licence and, given the status of the population, licences are most unlikely to be issued in the foreseeable future (NPWS, 2008).

The loss of Pearl Mussel populations is attributed to the continuous failure to produce new generations of mussels because of the loss of clean gravel beds, which have become infiltrated by fine sediment and/or over-grown by algae or macrophytes (NPWS, 2007b). While sedimentation can impact on any life stage of the species, juvenile mussels are most sensitive. During this time, exchange of water between the river and the substrate is essential in order to provide the young mussels with sufficient oxygen and food. Plumes of sediment can also cause adults to close up in order to prevent clogging of their gills. Prolonged closure can lead to the death of the adults through oxygen deprivation or starvation (NPWS, 2008).

Nutrient enrichment is the increase in the concentration of nutrients such as phosphorus and/or nitrogen in the water. Phosphorus and nitrogen compounds can be directly toxic to the Freshwater Pearl Mussel, however nutrient enrichment is most likely to impact indirectly through its contribution to algal blooms. The algae can block water exchange between the river and the river bed substrate, thereby reducing the oxygen concentration in the substrate and leading to juvenile deaths. This is further exacerbated when the algae die and decompose, further clogging the substrate. In the worst case, dense growths of algae can lead to night time oxygen depletion in the water column and if these conditions are sustained, adult deaths occur (NPWS, 2008).

Pressures and threats upon Pearl Mussel populations are discussed in NPWS (2007b). Furthermore, the Munster Blackwater Sub-basin Management Plan (NS2, 2010) provides a review of key pressures affecting the Freshwater Pearl Mussel in the Munster Blackwater catchment. As many of these pressures affect the general ecology of habitats and species of the Blackwater River SAC, these pressures are reviewed in Section 4 below, with additional information added, where available and relevant.

Under the assessment of ecological status macroinvertebrates include a special consideration of the conservation status of the freshwater pearl mussel in SACs protected for the species. In such areas where the freshwater pearl mussel is at unfavourable conservation status, the EPA must assign a status of 'less than good ecological status', where on the basis of specialist surveys undertaken to assess conservation status, the freshwater pearl mussel is found to be in unfavourable conservation status owing to water quality or hydrology in that water body (Freshwater Pearl Mussel Regulations, 2009).

The interim WFD status classification for the Munster Blackwater catchment as of December 2009 (note classification is based on date from 2006 to 2008). The Blackwater catchment river water bodies were classified as follows: 58 high status, 16 good status, 24 moderate, and 5 poor status

water bodies. Status was determined largely by macroinvertebrates, fish and physico-chemical status. The Freshwater Pearl Mussel is at unfavourable conservation status in the Munster Blackwater catchment. This led to the downgrading of 6 water bodies to moderate status. These water bodies would otherwise have been classified at high (1) and good (5) status. The WFD classifications for the catchment are shown in Figure 4.2. The most significant river stretch which would otherwise have had high or good status is the main Blackwater channel upstream of Mallow town. There is as a result, some discrepancy between the NS Share 2 WFD and the EPA WFD Status maps, as can be seen in Figure 4.3.

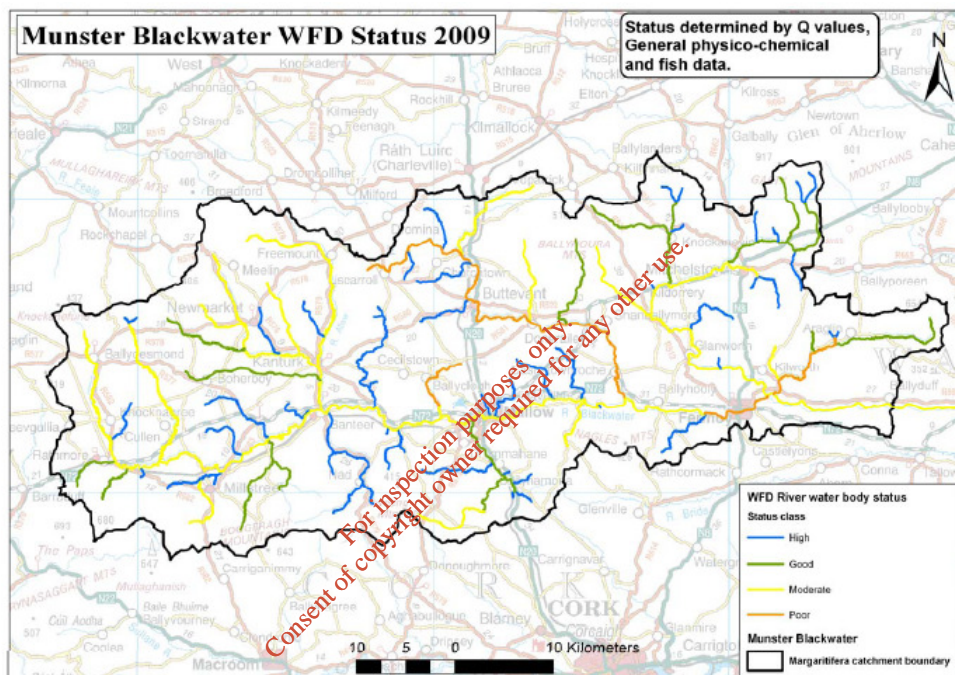


Figure 4.2 – 2009 WFD Status for Blackwater Catchment



Figure 4.3 – EPA WFD Status map showing Good Status in the Mid to Upper Blackwater, where populations of non-recruiting Pearl Mussel are located

4.4 Pressures on Pearl Mussel Populations

4.4.1 Drainage

Part of the Blackwater catchment has been previously drained, namely the Awbeg Drainage District. However the extent is below the national risk assessment threshold of 50% of river length within the water body. Furthermore, this area is not within the vicinity of Pearl Mussel populations and is at least 10km upstream of known Pearl Mussel areas (NS2, 2010).

4.4.2 Barriers

A major requirement of anadromous fish species is unimpeded access from the sea through the estuarine and tidal areas and up rivers to their spawning grounds. Barriers to migration can therefore impact upon the life cycle and success of species of conservation interest of the Blackwater River cSAC: River and Sea Lamprey and Twaite Shad. Furthermore, barriers can indirectly pose a threat to the efficient reproduction of Freshwater Pearl Mussels by affecting their host fish species (NS2, 2010).

The Central Fisheries Board (CFB) has identified possible barriers to migration in Ireland and national datasets indicate that barriers to fish migration may be a pressure in the Blackwater catchment. However, no details are available at present and River Basin Management Plans have identified this as a key data gap which must be addressed.

Careysville Weir, downstream of Fermoy, is known to be a barrier to fish movement when water levels are low, although fish run the weir when the water rises.

4.4.3 Agriculture practices

It is well known that catchment land-use adjacent to rivers is one of the primary factors governing the ecology of aquatic systems (Giller and Malmqvist 1998).

Agriculture is the dominant land use within the Blackwater catchment and many agricultural practices can result in an increase of nutrients or silt entering a river which can be damaging to the ecology of the system. In particular, nutrient enrichment through slurry spreading and toxic effects of liming, fertilizers, pesticides and herbicides can have serious implications for the health of freshwater systems and the species of conservation interest as discussed in Section 4.3.

NS2 (2010) identified the following as main issues in relation to the Blackwater catchment:

- Insufficient or lack of fencing of agricultural land – within the Blackwater catchment this has resulted in increased erosion from the use of fords by both vehicles and animals, with subsequent increased siltation as trampled patches of bare sediment leads to the washing of silt into the river. Animals being allowed in or near the river channel may also lead to increased nutrient enrichment of the watercourse. Cummins et al (2010) highlight grazing pressure as a particular threat to the Blackwater with ‘intensive cattle grazing’ recorded in 57% of sections surveyed¹ and specifically, the risk posed by animals being allowed direct access to riparian areas and the water channel itself.
- Inadequate or no buffer or tree line in areas where the river channel is in close proximity to agriculture or forestry. This may result in nutrients or silt being washed directly into the channel from agricultural land or forestry (e.g. following ploughing or felling of trees). Agriculture is the main source of total phosphorous inputs, mostly diffuse, to the Blackwater catchment, for example, 80% to the Awbeg (SWRBD, 2010a) and 79% to the Bride (SWRBD, 2010b).
- Unmanaged ditches and drainage.

4.4.4 Fords

NS2 (2010) identified six fords within the Blackwater catchment that have vehicular and animal access and could therefore cause siltation downstream: Farnankeel Bridge, Owentaragli, Funshion River, Araglin, Munster Blackwater, Ballyhooley.

4.4.5 Abstractions

Abstraction is the permanent or temporary removal of water from a waterbody. As biological communities are adapted to natural flow regimes, unnaturally low or altered flows caused by water abstraction can have damaging impacts on river systems and their ecology.

For the Blackwater catchment, NS2 (2010) assigned a risk classification to each waterbody in terms of abstractions. One water body was classified a ‘1a’ (at risk). Three waterbodies were assigned ‘1b’ (probably at risk) one waterbody was assigned a ‘2a’ (probably not at risk). A remaining ninety-three water bodies were classified as ‘2b’ (not at risk).

¹ during a national Kingfisher survey where 443 sections were surveyed along the Munster Blackwater covering some 217.4km.

Mallow Racecourse has a small scale abstraction for sprinklers which are operated 2-3 days prior to a race meeting. This is in close proximity to the Freshwater Pearl Mussel population.

4.4.6 Forestry

Forestry establishment (including drainage and ground preparation) and many associated management practices such as thinning, felling, re-planting and creation of stream crossings, can be a major source of silt and nutrients to watercourses. Site preparation including drainage, can cause erosion and release of silt into rivers or lakes and may involve the use of herbicide. During the establishment phase, fertilization and especially aerial fertilization, can lead to pollution concerns when close to watercourses or when drainage networks discharge to watercourses without adequate buffering (Kilfeather, 2000).

Brush left on site during and following harvesting releases nutrients through decomposition and this can impact for a significant number of years. Timber debris can also wash into streams and rivers and cause obstructions that not only moderate fish movement, but may also be responsible for flooding events further downstream.

Both insecticides and herbicides are used during afforestation and replanting of coniferous forestry. Insecticides, such as cypermethrin, are used at re-establishment stage (replanting) on post-clearfelled sites to limit attack of the pine weevil (*Hylobius abietus*) (NS2, 2010). Potential therefore exists for entry of insecticides to the aquatic environment.

There is a link between coniferous forestry and acidification impacts upon watercourses. A study on the interaction between forestry and aquatic ecology in Irish catchments showed that surface waters in heavily afforested sites on granite bedrock had significantly lower pH values (higher levels of acidity) than non-afforested sites (Kelly-Quin et al. 1997). More recently, research carried out by the Western RBD linked coniferous forest cover on peat soils overlying igneous/metamorphic rock (Granites) and sedimentary rock (Old Red Sandstones) to acidification impacts (NS2, 2010). Although the main known impacts from coniferous forestry to date have been as a result of increased sedimentation and nutrient pollution (rather than acidification) (NS2, 2010), the potential for increases in acidification have serious implications for the fisheries resource as well as for Freshwater Pearl Mussel populations. However, forest stands in the Munster Blackwater Catchment are located mainly in the upper tributary catchments and above the Freshwater Pearl Mussel populations (NS2, 2010).

Note that a body of research on the interactions between forestry and stream water quality has been built up by studies undertaken within the Blackwater catchment. The River Araglin Catchment Study has yielded much published works and has provided valuable inputs into the understanding of the interactions between forest and aquatic ecology in Munster (O'Halloran et al. 2000).

4.4.7 On-site waste water treatment systems

On-site wastewater treatment systems and other small effluent systems can be significant sources of nutrients to rivers. These are typically diffuse nutrient sources but more serious leaks and inappropriate systems can cause point source pollution damage.

The risk posed by on-site wastewater treatment systems to the Blackwater River was assessed by the Munster Blackwater Sub-basin Management Plan for Freshwater Pearl Mussel (NS2, 2010). This found that there is a very high to extreme risk from many on-site systems within the catchment in terms of pathogens and phosphorous load to surface waters.

4.4.8 Waste Water Treatment Plants

Within the Munster Blackwater catchment there are over 40 Waste Water Treatment Plants (WWTPs) that are point sources of nutrients to the Blackwater River (NS2, 2010). Of these, 18 WWTPs were listed as likely to have significant adverse effects on the Freshwater Pearl Mussel or its habitat. These are referenced in the respective assessments, as in some cases, upgrades to various plants has not been taken into account for such risk designation.

4.4.9 Quarries

19 registered quarries occur within the Munster Blackwater catchment (NS2, 2010). Only one of these quarries is located beside a Pearl Mussel location (J.A. Wood at Lackanamona in Mallow).

4.4.10 Miscellaneous

The Irish Sugar Factory near Mallow was closed in 2006. The existing lagoons at the site will be filled in and the site rehabilitated for future use as agricultural land. There is some risk of adverse impacts upon Freshwater Pearl Mussel populations that occur in the vicinity of the site during the sites' rehabilitation phase.

5 Conclusions

5.1 Ballyclough

While the Ballyclough discharge is generally compliant, the Finnow Stream is of poor ecological quality; very low assimilative capacity for phosphorus is likely to be the main cause of the reduced water quality observed. Localised impacts to qualifying species of the SAC (particularly the Pearl Mussel) may be significant due to the high vulnerability of these species to the effects of nutrient enrichment. In-combination factors may also be an issue, given that the Cecilstown septic tank also discharges to the Finnow Stream.

Given the fact that the WWTP discharges to a stream with low assimilative capacity which enters the Blackwater where pearl mussels and other qualifying species have been recorded, the screening exercise concludes that a Stage 2 assessment should be carried out.

Further assessment indicates that the negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Finnow confluence is considered a significant impact that will continue until nutrient removal is put in place at the plant. This is in contravention of Conservation Objective Number 2 for the SAC.

The assessment therefore concludes that impacts to the Freshwater Pearl Mussel, a qualifying interest for the Blackwater River (Cork/Waterford) cSAC, cannot be discounted at this stage, due to potential significant cumulative negative pressure from the Ballyclough and Cecilstown discharges.

5.2 Ballyhooley

The Ballyhooley WWTP is a relatively modern installation and is generating a good quality effluent. The main Blackwater River is in Good ecological condition at Ballyhooley and no measurable changes in BOD, Ammonia and Orthophosphate levels in the mean samples from 2008 and 2009.

Negative cumulative pressures on this stretch of the Blackwater River are considered to be negligible. The Ballyhooley plant is not predicted to be acting in combination with the Mallow

Blackwater discharge 16km upstream, or with the several discharges associated with Fermoy town further downstream.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Ballyhooley discharge are envisaged and therefore no further assessment is required.

5.3 Banteer

While the Banteer discharge is UWWT compliant, the proximity of the (secondary treatment only) plant to Pearl Mussels in the Blackwater is a key factor to be considered. Several other pressures occur in the environs of Kanturk to the north of Banteer along the Allow which may act in conjunction with the Banteer plant. The North Cork Co-op Creamery is of particular note in this regard.

Given the fact that several Pearl Mussel populations are found in close proximity to the Banteer WWTP, the screening exercise concludes that a Stage 2 assessment should be carried out.

The main Blackwater channel displays high ecological status downstream of the Allow and Glen River confluences. Sampling of the river downstream of the Banteer WWTP indicates that the river displays high status for BOD, Ammonia and Orthophosphate. As such, it may appear that the minor nutrient input from this plant is not leading to negative ecological impacts.

Given that high ecological conditions prevail in the Blackwater around the Allow and Glen River confluences, it is reasonable to suggest that the dilution factors and assimilative capacity in the Blackwater at this location are sufficiently high to absorb any low levels of phosphate and/or ammonia. Pearl Mussel populations in the immediate area are therefore unlikely to be impacted to any major degree along this stretch of the Blackwater. This takes into account the potential cumulative influence of the WWTP in Kanturk and other such pressures.

The assessment therefore concludes that, at present, potential impacts to the cSAC resulting from the Banteer discharge are not considered to be significant, given the excellent status of the Blackwater downstream of the WWTP and the lack of any measurable change in water chemistry. The plant should however be closely monitored for changes to this situation due to increased loading or increases in phosphate/ammonia levels in the effluent.

5.4 Boherbue

In the context of other discharges to the Allow catchment, the Boherbue plant generates a compliant effluent in relatively low volumes. The river is currently considered to be in good ecological condition. Other negative pressures to the qualifying interests of the cSAC may be resulting from other land uses (primarily agriculture) in the area. The Duhallow LIFE project aims to target agricultural pressures in the Allow River and thus further reduce negative cumulative pressures on the wider catchment.

The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Boherbue discharge are envisaged and therefore no further assessment is required.

5.5 Buttevant

The Buttevant WWTP is a modern installation and is generating an excellent effluent for the scale of the plant. The addition of efficient tertiary treatment means that it is unlikely to be contributing to significant nutrient input to the overall Awbeg River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.

In the context of other discharges to the Awbeg in the overall vicinity, the Doneraile WWTP has also been recently upgraded to tertiary treatment and will be contributing to an improvement in water quality in the catchment. The Shanballymore WWTP also produces a generally compliant effluent; an upgrade for this plant is also planned in the near future. It is therefore not considered that the Buttevant WWTP is acting in combination with other pressures to any significant degree.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Buttevant discharge are envisaged and therefore no further assessment is required.

5.6 Bweeng

In the context of other discharges to the Blackwater in the overall vicinity, the contemporary Bweeng plant generates a high quality effluent with low nutrient levels. This percolates to groundwater and the remaining nutrients in the effluent will be slowly diffused to the Cummeen Stream. The upper streams of the Clyda catchment appear to maintain a generally low-nutrient character; this is contributed to by the implementation of the Nitrates Directive. Given the small scale of the Bweeng discharge, and the excellent quality of effluent it generates, it is not seen as significant negative pressure. The Dromahane WWTP is a considerable distance downstream of Bweeng; it is not considered that the Bweeng plant is contributing to phosphate elevation downstream of Dromahane. Furthermore, an additional upgrade is planned for the WWTP, in the form of additional tertiary filters.

The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Bweeng discharge are envisaged and therefore no further assessment is required.

5.7 Castlelyons

The Castlelyons plant is significantly underloaded and in relation to the overall size of the catchment, the agglomeration is very small with minimal flows and is therefore unlikely to be contributing to significant nutrient input to the overall Bride River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.

The nearby Bridebridge plant has also been recently upgraded, is underloaded and is to be further upgraded with additional diffusers; it is not predicted to be acting in conjunction with the Castlelyons WWTP to a significant degree; diffusers are also to be added to the Bridebridge plant in the near future.. The river is currently considered to be in satisfactory ecological condition with good ecological conditions recorded upstream and downstream of the discharge. Inland Fisheries Ireland also have no concerns relating to the discharge. Qualifying interests which have the highest ecological sensitivity (Crayfish and Pearl Mussel) are not found in this sub-catchment.

The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Castlelyons discharge are envisaged and as such no further assessment is required.

5.8 Castletownroche

The Castletownroche WWTP is currently suffering from non-compliant effluent, despite being underloaded. However, downstream sampling indicates that the discharge has no measurable effect on water quality.

The assimilative capacity of the Awbeg has significantly improved in recent years due to the upgrade of the other major WWTPs along the Awbeg (Buttevant and Doneraile). The addition of tertiary treatment at these plants has led to notable improvement in water quality. These upgrades are acting cumulatively to negate the potential negative impact of the non-compliant Castletownroche WWTP. The Shanballymore WWTP also produces a generally compliant effluent; an upgrade for this plant is also planned in the near future. Due to this reduction in negative cumulative pressures along the Awbeg, it is envisaged that the Castletownroche WWTP is not leading to a decrease in water quality in the lower stretch of the river. Assimilative calculations have indicated that the plant currently only leads to an 0.002mg/l increase in Orthophosphate, which is not considered significant in relation to input to the main Blackwater channel to which the Awbeg flows.

Cork County Council is currently considering making use of the former Castletownroche septic tank which remains unused on the site of the WWTP. The tank may be incorporated into the treatment process as a primary settlement and treatment tank, before flowing to the current primary phase of the WWTP. This should result in an even higher quality of effluent.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Castletownroche WWTP discharge are therefore envisaged and thus no further assessment is required.

5.9 Churchtown

In the context of other discharges to the Awbeg in the overall vicinity, the contemporary Churchtown plant generates a high quality effluent with low nutrient levels. The river in the vicinity

of Churchtown is currently considered to be in satisfactory ecological condition. Other negative pressures to the qualifying interests of the cSAC may be resulting from other land uses (primarily agriculture) in the area. It is considered that the Churchtown WWTP is likely to be negating these negative impacts to some degree by minimising nutrient input from the agglomeration.

The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Churchtown discharge are envisaged and therefore no further assessment is required.

5.10 Clondulane

The Clondulane WWTP is a modern installation and is generating a good quality effluent; no mean measurable increase in nutrient levels in the Careysville have been recorded during Cork Co Co sampling. Ecological conditions downstream of the Careysville Stream confluence have improved in the Blackwater River in recent years, which is likely to be indicative of a reduction in localised nutrient input; the 2006 upgrade of the Clondulane plant may have contributed slightly to this improvement. Negative cumulative pressures on the Careysville Stream are considered to be negligible. The Clondulane plant is also not predicted to be acting in combination with the Fermoy Blackwater discharge.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Clondulane discharge are envisaged and therefore no further assessment is required.

5.11 Conna

The Conna plant is currently underloaded and sampling of the effluent indicates that it is not contributing to significant nutrient input in the overall Bride River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures. Occasional non-compliant BOD loading in the effluent is very infrequent; a new inlet sump has just been added to the plant's primary treatment phase. This addition is considered very likely to deal effectively with occasional spikes in BOD loading on the plant.

The upstream Rathcormack, Castlelyons and Bridebridge WWTPs have been recently upgraded and generate good quality effluents. Bridebridge is to be further upgraded with additional diffusers. Neither are predicted to be acting in conjunction with the Conna WWTP to a significant degree. The river is currently considered to be in satisfactory ecological condition with good ecological conditions recorded upstream and downstream of the discharge. Inland Fisheries Ireland have no concerns relating to the discharge. Qualifying interests which have the highest ecological sensitivity (Crayfish and Pearl Mussel) are not found in this sub-catchment. Negative pressure on water quality further downstream at Tallow is to be addressed by Waterford Co Co in the near future, thereby further improving water quality in the River Bride.

The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Conna discharge are envisaged and as such no further assessment is required.

5.12 Doneraile

The Doneraile WWTP is a modern installation and is generating an excellent effluent for the scale of the plant. The addition of efficient tertiary treatment means that it is unlikely to be contributing to significant nutrient input to the overall Awbeg River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.

In the context of other discharges to the Awbeg in the overall vicinity, the Buttevant WWTP has also been recently upgraded to tertiary treatment and will be contributing to an improvement in water quality in the catchment. The Shanballymore WWTP also produces a generally compliant effluent; an upgrade for this plant is also planned in the near future. It is therefore not considered that the Doneraile WWTP is acting in combination with other pressures to any significant degree.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Doneraile discharge are envisaged and therefore no further assessment is required.

5.13 Dromahane

While the Dromahane discharge is still generally compliant, the fact that the plant is overloaded and potentially contributing elevated levels of inorganic nutrients in close proximity to Pearl Mussel populations, is a key factor to be considered.

Numerous other pressures occur in the environs of Mallow which combine to apply negative pressure to the mussel and fish populations in this stretch of the Blackwater.

Given the fact that the Dromahane WWTP is currently overloaded and in need of upgrade and nutrient removal, combined with the fact that several Pearl Mussel populations are found in close proximity to the Blackwater-Clyda confluence, the screening exercise concludes that a Stage 2 assessment should be carried out.

Additional assessment indicates that the negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Clyda River confluence due to overloading and ongoing phosphorus input to the lower stretch of the river is considered a significant impact that will continue until nutrient removal is put in place at the plant. This is in contravention of Conservation Objective Number 2 for the cSAC. Significant cumulative pressure on Pearl Mussel populations in the environs of Mallow Town results from industrial discharges and WWTP input from Mallow and other smaller plants within a 10km radius, such as Ballyclough, Cecilstown and Lombardstown.

The assessment therefore concludes that impacts to the Freshwater Pearl Mussel, a qualifying interest for the Blackwater River (Cork/Waterford) cSAC, cannot be discounted at this stage, due to potential significant cumulative negative pressure from the overloaded secondary treatment-only Dromahane plant, when placed in the context of other major localised pressures around Mallow Town.

5.14 Fermoy

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.

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. The screening exercise therefore concludes that a Stage 2 assessment should be carried out.

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.

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.

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.

The main aspects (BOD, SS, COD, P & N) of the discharge are not considered to be a significant risk to the cSAC/SPA.

5.15 Glanworth

The Glanworth WWTP is currently not generating a compliant effluent. However, the receiving water does not appear to be being impacted by this discharge, which occurs a large distance upstream of the cSAC boundary. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures. Excellent

river conditions prevail in the Funshion just upstream of the Blackwater confluence and no negative impacts are predicted to be transferred to the latter waterbody.

In the context of other discharges to the Funshion in the overall vicinity, the Kildorrery WWTP is similar in scale and occurs 10km upstream; this generates an excellent quality effluent with negligible effects on water quality. This may in fact be negating against any negative impacts of the Glanworth discharge by maximising the assimilative capacity of the Funshion.

The Funshion displays High ecological status at Kilworth, just upstream of the Blackwater confluence. Such elevated water quality entering the Blackwater will contribute to maintaining good ecological conditions in the main channel.

The screening exercise concludes that despite producing a non-compliant effluent, the assimilative capacity of the Funshion negates any deleterious impacts. As such, no significant impacts to the Blackwater River cSAC resulting from the Glanworth discharge are envisaged and therefore no further assessment is required.

5.16 Kanturk

While the Kanturk discharge is UWWTP compliant, the proximity of the (secondary treatment only) plant to Pearl Mussels in the Blackwater, is a key factor to be considered. Several other pressures occur in the environs of Kanturk which potentially combine to apply negative pressure. The North Cork Co-op Creamery is of particular note in this regard.

Given the fact that IFI under consultation raised the issue of noted enrichment downstream of Kanturk, combined with the fact that several Pearl Mussel populations are found in close proximity to the Blackwater-Allow confluence, the screening exercise concludes that a Stage 2 assessment should be carried out.

Further assessment indicates that cumulative pressure on the Allow is considered to be quite high in the environs of Kanturk. However, EPA sampling indicates good ecological status downstream of the town and Cork Co Co sampling shows no measureable increase in nutrients in the River Allow downstream of the WWTP, Ducon Concrete and the North Cork Co-op Creamery. The main Blackwater channel also displays high ecological status downstream of the Allow and Glen River

confluences. Sampling of the river downstream of the Banteer WWTP indicates that the river displays high status for BOD, Ammonia and Orthophosphate. As such, it may appear that the nutrient input from these plants is not leading to negative ecological impacts.

Given that high ecological conditions prevail in the Blackwater around the Allow and Glen River confluences, it is reasonable to suggest that the dilution factors and assimilative capacity in the Blackwater at this location are sufficiently high to absorb the slightly elevated inorganic nutrient input potentially entering the system from Kanturk. Pearl Mussel populations in the immediate area are therefore unlikely to be impacted to any major degree along this stretch of the Blackwater.

The assessment therefore concludes that potential impacts to the cSAC resulting from the Kanturk discharge are not considered to be significant, given the satisfactory status of the River Allow and the excellent status of the Blackwater downstream of the confluence. Concerns raised by IFI regarding river conditions immediately downstream of the Kanturk discharge are likely to be related to a very localised impact that is not affecting the qualifying interests of the catchment at large. Therefore the assessment concludes that the risk of *significant* impacts to the cSAC from the Kanturk WWTP discharge can be ruled out.

5.17 Kildorrery

The Kildorrery WWTP is generating an excellent effluent for the scale of the plant. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.

In the context of other discharges to the Funshion in the overall vicinity, the Glanworth WWTP is similar in scale and occurs 10km downstream. Whilst being underloaded, the Glanworth plant is occasionally non-compliant for BOD, SS and COD. P and N levels in the effluent are also quite high. However, the Funshion is expected to have a high assimilative capacity for such input and the degree of geographical separation of the Kildorrery and Glanworth plants means that negative cumulative impacts are insignificant. The Funshion displays High ecological status at Kilworth, just upstream of the Blackwater confluence. Such elevated water quality entering the Blackwater will contribute to maintaining good ecological conditions in the main channel.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Kildorrery discharge are envisaged and therefore no further assessment is required.

5.18 Killavullen

The Killavullen WWTP is a relatively modern installation and is generating a good quality effluent. Ecological conditions have been seen to be improving in the Ross River in recent years, which may be indicative of improved effluent quality following the plant upgrade in 2001. The main Blackwater River is in High ecological condition at Killavullen and receives water of Good ecological quality from the Ross River; this is not expected to alter the chemical or ecological status of the receiving Blackwater.

Negative cumulative pressures on the Ross River are considered to be negligible. The Killavullen plant is not predicted to be acting in combination with the Mallow Blackwater discharge 9km upstream.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Killavullen discharge are envisaged and therefore no further assessment is required.

5.19 Kilworth

The Kilworth WWTP is a modern installation and is generating an excellent effluent for the scale of the plant. Efficient tertiary treatment means that it is unlikely to be contributing to significant nutrient input to the overall Douglas/Araglin sub-catchment. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in nutrient input.

Negative cumulative pressures on the River Douglas are considered to be negligible. The Kilworth plant is not predicted to be acting in combination with the Fermoy Blackwater discharge.

The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Kilworth discharge are envisaged and therefore no further assessment is required.

5.20 Mallow

The Mallow WWTW is underloaded and generates an effluent which is generally compliant for BOD, COD and SS; however, P and N levels may frequently be above tolerable thresholds for this sensitive stretch of the Blackwater which is under pressure from a number of other sources. Localised impacts to qualifying species of the SAC (particularly the Pearl Mussel) may be significant due to the high vulnerability of these species to the effects of nutrient enrichment. In-combination factors may also be an issue, given the urbanised and industrial nature of Mallow Town. The WWTW has been the cause of a number of pollution incidents in recent years. Other point pressures in the area include three IPPC-licensed facilities in Mallow Town, and the Glantane, Cecilstown, Lombardstown and Ballyclogh WWTPs which all discharge to the Blackwater or its tributaries within a 10km radius of Mallow.

Pollution events as have been reported are likely to cause temporary major deoxygenation of the river and/or siltation of the river bed. In serious cases, this will lead to fish kills, loss of macroinvertebrate diversity and further negative impacts to Pearl mussels downstream of Mallow through direct mortality of adult specimens. The screening exercise therefore concludes that a Stage 2 assessment should be carried out.

This additional assessment indicates that the potential negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Mallow WWTW discharge (in combination with other pressures located in the environs of Mallow Town) is considered a potentially significant impact. This is in contravention of Conservation Objective Number 2 for the cSAC. This is highly urbanised centre with an industrial aspect, where river quality is recorded as decreasing upstream of the plant; this is indicative of reduced assimilative capacity for the WWTW discharge. Another issue is the recorded levels of P and N entering the river at this location. Dilution factors in the Blackwater are high at this location, but the sheer number Pearl Mussel

The assessment therefore concludes that due to likely impacts to Freshwater Pearl Mussel, the possibility of significant impacts to the Blackwater River cSAC cannot be discounted at this stage.

5.21 Millstreet

While the Millstreet WWTP discharge appears generally compliant from sampling data, the fact that the plant is overloaded and potentially contributing elevated levels of inorganic nutrients in close proximity to Pearl Mussel populations, is a key factor to be considered. The Blackwater at Keale Bridge is still moderate in scale when compared to further downstream and is likely to have a comparatively lower assimilative capacity for inorganic nutrients.

Given the fact that the Millstreet WWTP is currently overloaded and in need of upgrade and nutrient removal, combined with the fact that at least one Pearl Mussel population is found in close proximity to the Blackwater-Finnow confluence, the screening exercise concludes that a Stage 2 assessment should be carried out.

This additional assessment indicates that at present, the negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Finnaw River confluence due to overloading and ongoing phosphorus input to said waterbody is considered a significant impact that will continue until nutrient removal is put in place at the plant. This is in contravention of Conservation Objective Number 2 for the cSAC. Overall cumulative impacts are low, but the Pearl Mussel populations in this region are low density and are highly fragmented.

The Millstreet plant is listed under the WSIP and an upgrade to the plant is planned after 2012. This upgrade will deal with the overloaded status of the plant. A tertiary nutrient removal phase is also recommended in the plant design. Once this upgrade has been put in place, it is considered that negative pressure on Pearl Mussel in the Blackwater downstream of Millstreet will be effectively mitigated against

The assessment therefore concludes that impacts to the Freshwater Pearl Mussel, a qualifying interest for the Blackwater River (Cork/Waterford) cSAC, cannot be discounted at this stage, due to potential significant negative pressure due to increased phosphorus loading from the overloaded secondary treatment-only Millstreet plant.

5.22 Newmarket

In the context of other discharges to the Dalua River and Allow catchment, the Newmarket plant generates a compliant effluent in low volumes. There is some lack of capacity for stormwater loading at the plant; on occasion, untreated material may bypass the plant and discharge directly to the river. While there is no evidence of impact from such stochastic events, Cork County Council has noted that it is aware of the issue. No Small Schemes funding is currently available to add additional stormwater capacity. However, the river is currently considered to be in good ecological condition with a further improvement in water quality from good to high recorded downstream of Newmarket.

Other negative pressures to the qualifying interests of the cSAC may be resulting from other land uses (primarily agriculture) in the area. The Duhallow LIFE project aims to target agricultural pressures in the Allow River and thus further reduce negative cumulative pressures on the wider catchment.

The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Newmarket discharge are envisaged and therefore no further assessment is required.

5.23 Rathcormack

The Rathcormack plant is significantly underloaded and sampling of the effluent indicates that it is not contributing to significant nutrient input in the overall Bride River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.

The downstream Castlelyons and Bridebridge plants have been recently upgraded and both generate a good quality effluent; they are not predicted to be acting in conjunction with the Rathcormack WWTP to a significant degree. It is also noted that the Bridebridge plant is to be further upgraded with additional diffusers. The river is currently considered to be in satisfactory ecological condition with good ecological conditions recorded upstream and downstream of the discharge. Inland Fisheries Ireland have no concerns relating to the discharge. Qualifying interests

which have the highest ecological sensitivity (Crayfish and Pearl Mussel) are not found in this sub-catchment.

The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Rathcormack discharge are envisaged and as such no further assessment is required.

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Appendix 1 – Natura 2000 Site Information

Natura 2000 Site	
Name	Blackwater River (Cork/Waterford)
Designation	Candidate Special Area of Conservation (Site Code 002170)
Basis	EU Habitats Directive (92/43/EEC)
Description	<p>From the NPWS Site Synopsis: 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 consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which includes the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun.</p> <p>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, <i>Salicornia</i> 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.</p> <p>The site is further selected for the following species listed on Annex II of the same directive – Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, White-clawed Crayfish, Twaite Shad, Atlantic Salmon, Otter and the Killarney Fern.</p> <p>A detailed description of the Blackwater catchment is contained in Chapter 4 of this document. The full NPWS Site Synopsis is reproduced in Appendix 25.</p>
Area	10150.13 Ha
Condition	<p>Overall, 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.</p> <p>Land use at the site is predominantly agricultural. The SAC site synopsis lists the main threats to the site and damaging activities as:-</p> <ul style="list-style-type: none"> • high inputs of nutrients into the river system from agricultural run-off and sewage plants; • dredging of the upper reaches of the Awbeg; • overgrazing within the woodland areas; • invasion by non-native species. <p>The EUNIS lists mowing/cutting, fertilization, grazing and water pollution as high intensity negative influences on the site (http://eunis.eea.europa.eu/sites.jsp).</p>
Conservation Interests	<p>SAC Qualifying Interests – Habitats</p> <p><u>Priority Annex I Habitats</u></p> <ul style="list-style-type: none"> • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, <i>Alnion incanae</i>, <i>Salicion albae</i>) (91E0);
<p>(Information Sources: NPWS Site Synopsis & EUNIS Site factsheet) (http://eunis.eea.europa.eu/sites.jsp)</p>	

	<ul style="list-style-type: none"> • <i>Taxus baccata</i> woods of the British Isles (91J0); <p>Non-priority Annex I Habitats</p> <ul style="list-style-type: none"> • 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); • Salicornia 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). <p>SAC Qualifying Interests – Annex II Species</p> <ul style="list-style-type: none"> • Sea Lamprey (<i>Petromyzon marinus</i>); • River Lamprey (<i>Lampetra fluviatilis</i>); • Brook Lamprey (<i>Lampetra planeri</i>); • Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>); • White-clawed Crayfish (<i>Austropotamobius pallipes</i>); • Twaite Shad (<i>Allosa fallax</i>); • Atlantic salmon (<i>Salmo salar</i>); • Otter (<i>Lutra lutra</i>); • Killarney Fern (<i>Trichomanes speciosum</i>)* <p>* also protected under the Flora Protection Order, 1999</p> <p>Additional features/species of conservation interest</p> <p>Habitats (classified as per Fossitt, 2000)</p> <ul style="list-style-type: none"> • Wet Willow-Alder-Ash-woodland (WN6); • Marsh (GM1); • Reed and large sedge swamp (FS1); • Wet grassland (GS4); • Wet heath (HH3); • Lowland Blanket Bog (PB3); • Semi-natural woodland (WN) and highly modified/non-native woodland (WD). <p>Plants (^FFlora Protection Order, 1999; ^RRed Data Book)</p> <ul style="list-style-type: none"> • Starved Wood Sedge (<i>Carex depauperata</i>)^{F,R}; • Pennyroyal (<i>Mentha pulegium</i>)^{F,R}; • Golden Dock (<i>Rumex maritimus</i>)^R; • Bird Cherry (<i>Prunus padus</i>)^R; • Bird's-nest orchid (<i>Neottia nidus-avid</i>)^R. <p>Mammals (protected under the Wildlife Act, 1976 & Wildlife Amendment Act, 2000^I, EU Habitats Directive Annex IV/V)^{II}, Red Data Book^{III}, Bonn Convention^{IV} and Bern Convention^V.</p> <ul style="list-style-type: none"> • Pine Marten (<i>Martes martes</i>)^{I, II, III, V}; • Badger (<i>Meles meles</i>)^{I, III, V}; • Irish Hare (<i>Lepus timidus hibernicus</i>)^{I, II, III, V}; • Daubenton's Bat (<i>Myotis daubentoni</i>)^{I, II, III, IV, V}; • Whiskered Bat (<i>Myotis mystacinus</i>)^{I, II, IV, V}; • Natterer's Bat (<i>Myotis nattereri</i>)^{I, II, IV, V}; • Common Pipistrelle Bat (<i>Pipistrellus pipistrellus</i>)^{I, II, III, IV, V}; • Brown Long-eared bat (<i>Plecotus auritus</i>)^{I, II, III, IV, V}.
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	<p><u>Amphibians</u></p> <ul style="list-style-type: none"> • Common Frog (<i>Rana temporaria</i>)^{i, II, III, V} <p><u>Invertebrates</u> (rare/scarce)</p> <ul style="list-style-type: none"> • <i>Metriopectera rosellii</i> • <i>Anodonta cygnea</i> <p><u>Birds</u> (regularly-occurring species listed on Annex I as per Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) ('Birds Directive')</p> <ul style="list-style-type: none"> • Bewick's Swan (<i>Cygnus columbianus</i>); • Whooper Swan (<i>Cygnus Cygnus</i>); • Little Egret (<i>Egretta garzetta</i>); • Peregrine Falcon (<i>Falco peregrinus</i>); • Kingfisher (<i>Alcedo atthis</i>); • Golden Plover (<i>Pluvialis apricaria</i>); • Bar-tailed Godwit (<i>Limosa lapponica</i>). <p><u>Birds</u> other species of conservation interest for the Blackwater River SAC, the Blackwater Callows Special Protection Area (Site Code 4094)* and the Blackwater Estuary Special Protection Area (Site Code 4028)*</p> <ul style="list-style-type: none"> • Barn Owl (<i>Tyto alba</i>); • Long-eared Owl (<i>Asio otus</i>); • Dipper (<i>Cinclus cinclus</i>); • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>); • Shelduck (<i>Tadorna tadorna</i>); • Wigeon (<i>Anas penelope</i>); • Teal (<i>Anas crecca</i>); • Mallard (<i>Anas platyrhynchos</i>); • Shoveler (<i>Anas clypeata</i>); • Pochard (<i>Aythya ferina</i>); • Goldeneye (<i>Bucephala clangula</i>); • Red-breasted Merganser (<i>Mergus serrator</i>); • Cormorant (<i>Phalacrocorax carbo</i>); • Grey Heron (<i>Ardea cinerea</i>); • Oystercatcher (<i>Haematopus ostralegus</i>); • Ringed Plover (<i>Charadrius hiaticula</i>); • Grey Plover (<i>Pluvialis squatarola</i>); • Knot (<i>Calidris canutus</i>); • Lapwing (<i>Vanellus vanellus</i>); • Dunlin (<i>Calidris alpina</i>); • Black-tailed Godwit (<i>Limosa limosa</i>); • Curlew (<i>Numenius arquata</i>); • Greenshank (<i>Tringa nebularia</i>); • Redshank (<i>Tringa totanus</i>); • Turnstone (<i>Arenaria interpres</i>); • Black-headed Gull (<i>Chroicocephalus ridibundus</i>); • Common Gull (<i>Larus canus</i>); • Lesser Black-backed Gull (<i>Larus fuscus</i>); • Herring Gull (<i>Larus argentatus</i>); • Great Black-backed Gull (<i>Larus marinus</i>). <p>*designated under Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) ('Birds Directive').</p>
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Appendix 2 – Ballyclough Screening & Assessment

EPA Ref: D0441-01

Project	
Location	Discharge associated with agglomeration of Ballyclough village, County Cork.
Distance from designated site	4km: WWTP discharges to the Finnow Stream, upstream of the cSAC boundary.
Brief description	<p>Ballyclough Village is located on the L1203, circa 7 Km North-West of Mallow town. The village is well developed from the point of public services such as a primary school, shops and amenities.</p> <p>The waste water from the Clondulane allglomeration is currently treated by a package treatment plant with a design PE of 800, prior to being discharged to the Finnow Stream. Ballyclough wastewater treatment plant (WWTP) was constructed in 2002 on the site of a pre-existing septic tank which had previously served the village.</p> <p>The main elements of the WWTP are;</p> <ol style="list-style-type: none"> 1. Inlet works: Forward feeding pump sump. 2. Secondary treatment: Sequence Batch Reactor - 2 Tanks 3. Discharge to Finnow Stream <p>The wastewater in Ballyclough is collected in a partially combined foul and sewer drainage network and gravitates to the wastewater treatment plant. There are two ejector stations which contributing to the gravity. Each station serves a small cluster of houses (8-14 houses). Ballyclough WWTP is operated by the staff of Cork County Council whose duties also involve the maintenance of a number of other small WWTP's in the area.</p> <p>The pollution load from the Clondulane agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & creches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. There are no industrial waste streams discharging into the sewerage network.</p> <p>The main source of emissions from the works is via a 300mm open pipe outfall to the Finnow Stream.</p> <p>The plant currently services an agglomeration of 600 and is therefore underloaded.</p>

<p>Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?</p>	<p>No</p>
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<p>Stage 1 - Screening</p>	
<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 Ballyclough agglomeration receives secondary treatment at the main WWTP, before discharging to a tributary stream of the Finnow Stream. The effluent then disperses in the water column.</p> <p>An observation of the Finnow Stream downstream of the WWTP revealed that at this location, the river is very minor in scale (1-2m wide) with slow flows and occasional riffles along a shallow incline.</p> <p>The most recent EPA water quality sampling data from 2009 indicates that the Finnow (Ballyclough) Stream displays moderate (Q=3-4) ecological conditions just upstream of the Blackwater confluence. However, White-clawed crayfish were recorded at this location for the first time in 2009.</p> <p>The overall ecological status of the catchment is listed by the EPA as unchanged from historical poor and moderate water quality results.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following effluent levels from 2009 in mg/l:</p> <ul style="list-style-type: none"> • BOD = 6 • SS = 38 • COD = 95 • P = 2.6 • N = 6 <p>These are generally compliant; the suspended solids value lies just above the threshold. Mean sampling data from 2008 to 2009 indicates a overall average SS of 7.64mg/l, a compliant figure.</p> <p>Sampling results of the Finnow Stream taken at the same time as the effluent results show no detectable decrease in BOD or Ammonia in the downstream sample these were attributed High Status under the WFD River classification system. However, elevated Orthophosphate levels were reported between the upstream and downstream samples, rising from 0.06 to 0.13mg/l, a 'Moderate' result. Similar increases in phosphate have also be recorded downstream of the Cecilstown septic tank, approximately 2km upstream of Ballyclough. However, no obvious signs of nutrient enrichment were observed.</p> <p>The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but is should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Ballyclough WWTP.</p> <p>The Water Framework Directive assigns 'Poor' status to the Finnow (Ballyclough) Stream; this is based on historical results for</p>

	<p>Macroinvertebrate diversity from the EPA sampling locations.</p> <p>The Second Draft Freshwater Pearl Mussel Sub-Basin Plan lists the Ballyclough WWTP as potentially having an adverse effect on the pearl mussel, given that there are records of this species downstream of the plant. The Finnow Stream enters the Blackwater just upstream of the known high concentration of pearl mussel populations upstream and downstream of Mallow town.</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>The Ceceilstown septic tank also discharges to the Finnow (Ballyclough) Stream in close proximity to Ballyclough. This provides secondary treatment only, without nitrogen/phosphorus removal. The plant dates from the 1950s, and despite being underloaded and generating a UWWT-compliant effluent, Cecilstown, in combination with Ballyclough WWTP, may be contributing to elevated levels of inorganic eutrophying nutrients which enter the Blackwater upstream of a large number of freshwater pearl mussels.</p> <p>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.</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; Climate change.</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 Finnow Stream at 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 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 <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter. Crayfish were recorded in the lowest stretch of the Finnow (Ballyclough) Stream in 2009. It is unclear whether this is the result of an intentional translocation, or a previously unknown naturally occurring sub-population.</p> <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. The cumulative influence of inorganic nutrients entering the Blackwater from the Finnow Stream may contribute to depressing the reproductive capacity of the Blackwater pearl mussel population.</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. Algal mats were observed in slow stretches of the Finnow stream; this is indicative of gross eutrophication. However, the Finnow Stream is unlikely to act as a key spawning river for Salmon.</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 species which have also been recorded in the overall Blackwater catchment. Macrophytes were not observed in great numbers in the Finnow Stream.</p> <p>Crayfish sensitivity to changes in water quality can result in significant losses following pollution incidents. Eutrophication can lead to luxuriant plant growth, which in turn traps silt and can result in deoxygenation at night, leading to loss of crayfish habitat. The presence of Crayfish in the lower reaches of the Finnow Stream is therefore surprising.</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>
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<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 overall Blackwater catchment is under threat from a variety of sources, including run-off from intensive agriculture, especially in the well known agricultural area known as the Golden Vale. Nutrient run-off, sedimentation and acidification from forestry also put pressure on the river further up its reaches, where substantial areas of the catchment are under coniferous cover. Up until recently, the level of treatment of sewage being discharged to the river Blackwater 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 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.</p> <p>Mean sampling results for the Ballyclough WWTP from 2008/09 show Total P values in the effluent of 4.78mg/l; slightly lower levels have been recorded in the effluent of the Cecilstown septic tank. Ongoing phosphorus input in the vicinity of the Blackwater pearl mussel population will lead to progressive ageing of the population without recruitment and eventual extinction.</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>While the Ballyclough discharge is generally compliant, the Finnow Stream is of poor ecological quality; very low assimilative capacity for phosphorus is likely to be the main cause of the reduced water quality observed. Localised impacts to qualifying species of the SAC (particularly the Pearl Mussel) may be significant due to the high vulnerability of these species to the effects of nutrient enrichment. In combination factors may also be an issue, given that the Cecilstown septic tank also discharges to the Finnow Stream.</p> <p>Given the fact that the WWTP discharges to a stream with low assimilative capacity which enters the Blackwater where pearl mussels and other qualifying species have been recorded, the screening exercise concludes that further assessment should be carried out in Stage 2 below.</p> <p>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	
<p>Describe the elements of the plan that are likely to give rise to significant effects on the site</p>	<p>Waste water treatment plants can contribute significant nutrient and organic loads to rivers. There is potential that the discharge from the Ballyclough WWTP is in combination with other activities within the Finnow Stream and Blackwater River catchments is leading to increased levels of nutrients in the main channel of the Blackwater. This may lead to progressive eutrophication of the river.</p>
<p>Set out the conservation objectives of the site</p>	<p>European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas</p>

	<p>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> (Alno-Padion, Alnion incanae, Salicion albae) (91E0); <i>Taxus baccata</i> woods of the British Isles (91J0); Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (3260); Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</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>); Twain Snad (<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 users and relevant authorities. <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>Describe how the project will affect key species and key habitats</p>	<p>Of key concern in relation to the Ballyclough WWTP is potential negative impact to the Freshwater Pearl Mussel, which acts as a keystone species for the SAC. This species requires stable cobble and gravel substrate with very little fine material below pea-sized gravel. Adult mussels are two-thirds buried and juveniles up to five to ten years old are totally buried within the substrate. The lack of fine material in the river bed allows for free water exchange between the open river and the water within the substrate. The free exchange of water means that oxygen levels within the substrate do not fall below those of the open water. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels. The clean substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. Organic particles within the substrate can exacerbate the problem by consuming oxygen during the process of decomposition. The habitat must be free of</p>

	<p>filamentous algal growth and rooted macrophyte growth. Both block the free exchange of water between the river and the substrate and may also cause night time drops in oxygen at the water-sediment interface. The open water must be of high quality with very low nutrient concentrations, in order to limit algal and macrophyte growth. Nutrient levels must be close to the reference levels for the river they inhabit. Phosphorus must never reach values that could allow for sustained, excessive filamentous algal growth. The presence of sufficient salmonid fish to carry the larval glochidial stage of the pearl mussel life cycle is essential.</p> <p>A number of surveys have identified numerous pearl mussel colonies in the environs of Mallow Town, immediately downstream of the Finnow Stream's confluence with the Blackwater. Reproductive success in this population is negligible, owing to historic pollution of the river and ongoing elevated inorganic nutrient levels in the water column.</p> <p>The Ballyclough WWTP produces a generally good quality effluent that is unlikely to affect any of the qualifying interests through direct deoxygenation of the river or accumulation of sediment. However, the noted increases in Orthophosphate downstream of the discharge are a key concern. Cumulative influences such as the nutrient content of the Cecilstown WWTP located 2km upstream may exacerbate these negative effects.</p> <p>In relation to the other qualifying species of the Blackwater cSAC, 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. Such changes are likely to affect stocks of salmon within the river, a qualifying species that is already under pressure in the catchment. Lamprey, which also require high water quality with low levels of sediment are also likely to be similarly affected.</p> <p>Reduction or changes in overall fish stocks will have subsequent effects on predators, most notably otter, for which the site is also designated.</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>Elevated levels of suspended solids from effluent discharges pose a risk to salmon and lamprey recruitment where settlement on spawning gravels and/or redds may occur.</p> <p>Given the historic poor water quality in the Finnow Stream, it is likely that the above species are unlikely to utilise said river for feeding etc. (i.e. the river does not contribute to the overall species richness of the site).</p> <p>By contrast, the newly-discovered presence of the White-clawed crayfish in the river is a marked extension of the known distribution of the species in the area; this warrants further survey work.</p>
<p>Describe how the integrity of the site (determined by structure and function and conservation objectives) is likely to be affected by the</p>	<p>The key ecological relationships that define the structure and function of the Blackwater River as part of the cSAC as a whole are likely to be impacted by potential nutrient enrichment. However, given the minor scale of the discharge, systemic disturbance is not envisaged.</p> <p>The critical matter relating to the Ballyclough discharge concerns the</p>

<p>project or plan (e.g. loss of habitat, disturbance, disruption, chemical changes, hydrological changes etc).</p>	<p>threat posed to remnant Freshwater Pearl Mussel populations found in the Blackwater downstream of the Finnow confluence. EPA sampling of the Blackwater itself downstream of the Finnow confluence indicates that the river displays High ecological status (Q=4-5). However, this may not reflect the pressure on the Freshwater pearl mussel colonies in the area caused by increased Orthophosphate concentrations.</p> <p>The Blackwater remains an open Salmon fishery, indicating Inland Fisheries Ireland's opinion that the species remains in harvestable surplus for the catchment. The assimilative capacity of the Blackwater for nutrients is high overall, but localised deoxygenation of the water column or clogging of the waterbody with macroalgae and macrophytes may be considered a significant impact to migrating and spawning salmon. Lamprey are known to require equitable water quality standards to salmon. These species are unlikely to be affected by minor changes in nutrient levels in the main Blackwater caused by the influence of the Finnow Stream</p> <p>Reduction in key diet species such as salmonids may negatively affect otter populations in the catchment. Competition with the invasive non-native mink may act in combination in this regard. Again, such impacts downstream of the relatively small scale Cecilstown discharge are considered unlikely.</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>Overall, the Ballyclough WWTP generates UWWT compliant effluent, and is currently under loaded, having been upgraded in 2002. However, only secondary treatment is currently applied. There are no plans in place to upgrade the plant to tertiary treatment.</p> <p>The Freshwater Pearl Mussel Sub-basin Plan makes specific reference to investigating the need for nutrient removal at the plant, owing to the proximal downstream presence of pearl mussels.</p>
<p>Conclusion</p>	<p>In conclusion, the negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Finnow confluence is considered a significant impact that will continue until nutrient removal is put in place at the plant. This is in contravention of Conservation Objective Number 2 for the cSAC.</p> <p>The assessment therefore concludes that impacts to the Freshwater Pearl Mussel, a qualifying interest for the Blackwater River (Cork/Waterford) cSAC, cannot be discounted at this stage, due to potential significant cumulative negative pressure from the Ballyclough and Cecilstown discharges.</p>

Appendix 3 – Ballyhooley Screening

EPA Ref: D0432-01

Project	
Location	Discharge associated with agglomeration of Ballyhooley village, County Cork.
Distance from designated site	0km: Ballyhooley WWTP discharges to the Blackwater River, inside the cSAC boundary.
Brief description	<p>Ballyhooley is situated along the national Primary Route, N72, between the towns of Fermoy and Mallow. The village is bounded to the south by the River Blackwater and to the extreme north by the disused Fermoy Mallow Railway line.</p> <p>The wastewater in Ballyhooley is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant.</p> <p>Ballyhooley WWTP is designed for a Population Equivalent (PE) of 750, which was commissioned in 2006. Activated Sludge is the process employed at the Ballyhooley waste water treatment plant. Influent initially gravitates into the inlet works, consisting of a automatic and manual bypass. Following the screening of the raw sewerage, influent a circular concrete inlet sump, from where the effluent is pumped to 2 Nr steel CAS Tanks. The CAS Tanks consists of a aeration zone followed by a settlement chamber. The solids settle while the supernatant flows over the weir and discharges to the river.</p> <p>The pollution load for the Ballyhooley agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & creches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP.</p> <p>The final effluent is discharged to the Blackwater River, which is adjacent to the wastewater treatment plant site.</p> <p>The plant currently services an agglomeration with an estimated PE of 545, based on hydraulic loading, and is therefore underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

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 Ballyhooley agglomeration receives secondary treatment at the WWTP, before discharging to the Blackwater River. The effluent then disperses in the water column.</p> <p>An observation of the Blackwater at this location, indicates that the river is major in scale (>18m wide) with moderate flows and occasional riffles over gravel beds. The banks of the river display mature riparian treelines. The Blackwater displays Good ecological status downstream of the WWTP at Ballyhooley and displays no evidence of direct impacts to water quality.</p> <p>Ballyhooley is located 16km downstream of Mallow, where a number of pressures combine to seriously reduce water quality in the environs of the town. Biological recovery is seen to develop within 3km of the town and High conditions are restored before the river reaches Killavullen. As such, no cumulative impacts between the Ballyhooley, Killavullen and Mallow WWTPs are envisaged.</p> <p>A population of Freshwater Pearl Mussels is known from the vicinity of Ballyhooley Bridge.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following effluent levels from 2009 in mg/l:</p> <ul style="list-style-type: none"> • BOD = 9 • SS = 24 • COD = 75 • P = 4 • N = 38.2 <p>As such, the plant is compliant according to UWWT thresholds. Furthermore, mean sampling data of the Blackwater between 2008 and 2009 indicates that the discharge leads to no net change in water chemistry between upstream and downstream points. The Blackwater maintain High status for BOD, Ammonia and Orthophosphate downstream of the WWTP. Given the small scale of the plant in the context of the large scale of the Blackwater at this location, the degree of nutrient input entering the river at this location is negligible.</p> <p>The main channel of the Blackwater is designated as a Salmonid River in the European Communities (Quality of Salmonid Waters) Regulations, 1988. Downstream sampling indicates that the Ballyhooley plant is compliant with these regulations.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Ballyhooley WWTP and as such it is considered to be generating an effluent which is acceptable from a fisheries perspective.</p> <p>The Second Draft Freshwater Pearl Mussel Sub-Basin Plan does not list the Ballyhooley WWTP as being a risk to Freshwater Pearl Mussels in the Blackwater River, despite the proximity of the plant to a known population at Ballyhooley Bridge.</p>
<p>Describe any likely direct, indirect or secondary impacts of the project</p>	<p>All impacts relate to the influence of the contents of the respective effluents entering the receiving waters. No construction, land-take etc.</p>

<p>(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>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>The Killavullen WWTP discharge is very small in scale in the context of the Blackwater River to which the Ross River flows. High ecological status is found in the Blackwater at this location, indicating a high assimilative capacity. It is considered that the degree of nutrients contributed to the Blackwater at this location is negligible and thus insignificant in relation to Pearl Mussels in the main channel.</p> <p>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.</p> <p>Except from the aforementioned agriculture, cumulative pressures along this stretch of the Blackwater are relatively low. One EPA-licensed facility is located 2km downstream at Killathy. This is a poultry rearing installation on a farm holding. Roof run-off from the buildings flows to groundwater and manure from the plant is recycled via slurry spreading. There is no surface water discharge to the Blackwater River.</p>
<p>Describe any likely changes to the site arising as a result of:</p> <ul style="list-style-type: none"> Reduction of habitat area; Disturbance of key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of 	<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 River Blackwater at this location may result in a range of changes to the SAC, both on a localised and system-wide basis.</p>

<p>conservation value; Climate change.</p>	<p>The following key species of the SAC are not expected to be impacted by the discharge:</p> <ul style="list-style-type: none"> • Killarney Fern - Non water-dependent species • Twaité Shad - Distribution restricted to lower reaches of River Blackwater • Sea lamprey - Anadromous phase of species restricted to lower stretches of catchment • White-clawed crayfish - Not known from the Ross River or the receiving stretch of the Blackwater River. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter.</p> <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. The Ballyhooley discharge is very small in scale and is not considered to be contributing significant nutrients to the Blackwater. It is not listed as a risk in the Freshwater Pearl Mussel Sub-basin Plan.</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. Good ecological conditions are found downstream of the Ballyhooley discharge.</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 species which have also been recorded in the overall Blackwater catchment. Macrophytes were not observed in great numbers in the Blackwater River at this location and eutrophication is not considered to be an issue.</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 overall Blackwater catchment is under threat from a variety of sources, including run-off from intensive agriculture, especially in the well known agricultural area known as the Golden Vale. Nutrient run-off, sedimentation and acidification from forestry also put pressure on the river further up its reaches, where substantial areas of the catchment are under coniferous cover. Up until recently, the level of treatment of sewage being discharged to the river Blackwater 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 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.</p> <p>The Ballyhooley WWTP is relatively small in scale and generates a compliant effluent. Despite not incorporating a nutrient removal phase, no measurable increase in Phosphorus or Nitrogen was detected in the Blackwater River at this location which displays High WFD status for these variables. Due to a lack of cumulative pressure along this stretch of the Blackwater, it is not considered that the Ballyhooley discharge is having a significant effect on Pearl Mussel colonies downstream of the plant.</p> <p>It is not envisaged that the discharge will interfere with the key ecological relationships that define the structure or function of the cSAC.</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 Ballyhooley WWTP is a relatively modern installation and is generating a good quality effluent. The main Blackwater River is in Good ecological condition at Ballyhooley and no measurable changes in BOD, Ammonia and Orthophosphate levels in the mean samples from 2008 and 2009.</p> <p>Negative cumulative pressures on this stretch of the Blackwater River are considered to be negligible. The Ballyhooley plant is not predicted to be acting in combination with the Mallow Blackwater discharge 16km upstream, or with the several discharges associated with Fermoy town further downstream.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Ballyhooley discharge are envisaged and therefore no further assessment is required.</p>

Appendix 4 – Banteer Screening & Assessment

EPA Ref: D0448-01

Project	
Location	Discharge associated with agglomeration of Banteer village, County Cork.
Distance from designated site	0km: WWTP discharges to the Blackwater River, inside the cSAC boundary.
Brief description	<p>Banteer Village is located on the R579, 18 Km west of Mallow town. The village is well developed from the point of public services such as a primary school, shops and amenities. The waste water from the Banteer agglomeration is currently treated by a package treatment plant prior to being discharged to the River Blackwater.</p> <p>Banteer wastewater treatment plant (WWTP) was constructed in 2000 on the site of a pre-existing septic tank which had previously served the Village. The design PE of the plant is 850.</p> <p>The main elements of the WWTP are;</p> <ol style="list-style-type: none"> 1. Inlet works: Forward feeding pump sump. 2. Secondary treatment: Activated Sludge (Aeration Tank and Clarifier) 3. Discharge to River Blackwater <p>The wastewater in Banteer is collected in a partially combined foul and sewer drainage network and gravitates to the wastewater treatment plant.</p> <p>The pollution load from the Banteer agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & creches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. There are no industrial waste streams discharging into the sewerage network.</p> <p>The main source of emissions from the works is via a 225mm open pipe outfall to the River Blackwater.</p> <p>The WWTP currently services an agglomeration with a PE of 700. The plant is therefore underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

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 Banteer agglomeration receives secondary treatment at the WWTP, before discharging to the River Blackwater. The effluent then disperses in the water column.</p> <p>An observation of the Blackwater downstream of the WWTP revealed that at this location, the river is major in scale (>12m wide) with slow flows and occasional riffles over gravel beds. The banks of the river display mature riparian treelines.</p> <p>The most recent EPA water quality sampling data indicates that the River Blackwater displays high (Q=4-5) ecological conditions at Dromcummer, which lies downstream of the Glen River confluence. This is maintained further downstream at Roskeen Bridge, before water quality diminishes somewhat in the environs of Mallow Town.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following effluent levels from 2009 in mg/l:</p> <ul style="list-style-type: none"> • BOD = 8 • SS = 6 • COD = 32 • P = 0.9 • N = 12.1 <p>These results indicate an excellent standard of treatment at the plant. Mean samples between 2007 and 2009 show that this standard is maintained over time. Total phosphate levels are relatively low for a plant with no tertiary phase of treatment. No measureable increases in BOD, Ammonia or Orthophosphate in the Blackwater downstream of the discharge were recorded at the time of sampling.</p> <p>The main channel of the Blackwater is designated as a Salmonid River in the European Communities (Quality of Salmonid Waters) Regulations, 1988. Downstream sampling indicates that the Banteer plant is compliant with these regulations.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Banteer plant in relation to fisheries.</p> <p>The Water Framework Directive assigns 'Moderate' status to the Blackwater River; this is based on the presence of non-recruiting populations of Freshwater Pearl Mussels at various locations along this stretch. Records exist at Ballymaquirk, Dromcummer and Roskeen and populations are also likely to exist in the river between these locations.</p> <p>The Second Draft Freshwater Pearl Mussel Sub-Basin Plan lists the Banteer as potentially having an adverse effect on the pearl mussel, given that there are records of this species in close proximity downstream of the plant. Pearl mussel populations require rivers to have an extremely low nutrient concentration to facilitate reproduction. Despite only being a secondary treatment plant, nutrient levels in the Banteer discharge are comparatively low for an agglomeration of this size.</p>
<p>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with</p>	<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>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>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>Other WWTPs in the immediate area are the Kanturk WWTP and North Cork Co-op Creamery (Allow River), the Lyre and Nadd WWTPs (Glen River) and the Lombardstown septic tank (10km downstream on the Blackwater). Other discharges, including the Mallow WWTP are located even further downstream.</p> <p>Ducon Concrete is also located on the River Allow downstream of the Kanturk WWTP. This is a processing plant which produces building materials. No quarrying occurs at this location, but an industrial discharge occurs from the plant and flows to the River Allow.</p> <p>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.</p>
<p>Describe any likely changes to the site arising as a result of:</p> <ul style="list-style-type: none"> Reduction of habitat area; Disturbance of key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value; Climate change. 	<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 by the discharge:</p> <ul style="list-style-type: none"> ● Killarney Fern - Non water-dependent species

	<ul style="list-style-type: none"> • Twaité Shad - Distribution restricted to lower reaches of River Blackwater • Sea lamprey - Anadromous phase of species restricted to lower stretches of catchment • White-clawed crayfish – Not found in upland peaty and acidic rivers such as the Clyda River/Cummeen Stream <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. A number of fragmented populations of this species are found in the vicinity of Banteer. However, the Blackwater displays high ecological conditions along this stretch, and the low-nutrient Banteer discharge results in no measurable changes in water chemistry.</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. As stated, there is little evidence of such impacts in this stretch of the Blackwater, and no impacts to migrating salmon are envisaged.</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 species which have also been recorded in the overall Blackwater catchment. Some macrophytes were observed in the Blackwater at this location, though not in densities high enough to lead to major disruption of these species.</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 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.</p> <p>The River Blackwater is listed by the EPA as overall in satisfactory</p>

	<p>condition, with only moderate to poor conditions downstream of the major urban centres, Mallow and Fermoy. However, Banteer is located only 1km upstream of a known Pearl Mussel population in the Blackwater River. The current lack of nutrient removal via tertiary treatment at the plant could potentially result in elevated levels of inorganic nutrients entering the Blackwater which may affect these mussel populations.</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>While the Banteer discharge is UWWT compliant, the proximity of the (secondary treatment only) plant to Pearl Mussels in the Blackwater is a key factor to be considered.</p> <p>Several other pressures occur in the environs of Kanturk to the north of Banteer along the Allow which may act in conjunction with the Banteer plant. The North Cork Co-op Creamery is of particular note in this regard.</p> <p>Given the fact that several Pearl Mussel populations are found in close proximity to the Banteer WWTP, the screening exercise concludes that further assessment should be carried out in Stage 2 below.</p> <p>This assessment considers the potential impacts of the discharge with specific reference to the species and/or habitats which may be impacted.</p>

<h3>Stage 2 - Project Assessment</h3>	
<p>Describe the elements of the plan that are likely to give rise to significant effects on the site</p>	<p>Waste water treatment plants can contribute significant nutrient and organic loads to rivers. While the Banteer plant generates a high quality effluent, the very close proximity of a known population of Freshwater Pearl Mussels means that this species could potentially be adversely affected by the discharge.</p>
<p>Set out the conservation objectives of the site</p>	<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> <p>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> (Alno-Padion, Alnion incanae, Salicion albae) (91E0);</p>

	<p><i>Taxus baccata</i> woods of the British Isles (91J0); Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (3260); Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330); Mediterranean salt meadows (<i>Juncetali 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).</p> <p>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>)</p> <p>3. To maintain the extent, species richness and biodiversity of the entire site.</p> <p>4. To establish effective liaison and co-operation with landowners, legal 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>Describe how the project will affect key species and key habitats</p>	<p>Of key concern in relation to the Banteer WWTP is potential negative impact to the Freshwater Pearl Mussel, which acts as a keystone species for the SAC. This species requires stable cobble and gravel substrate with very little fine material below pea-sized gravel. Adult mussels are two-thirds buried and juveniles up to five to ten years old are totally buried within the substrate. The lack of fine material in the river bed allows for free water exchange between the open river and the water within the substrate. The free exchange of water means that oxygen levels within the substrate do not fall below those of the open water. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels. The clean substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. Organic particles within the substrate can exacerbate the problem by consuming oxygen during the process of decomposition. The habitat must be free of filamentous algal growth and rooted macrophyte growth. Both block the free exchange of water between the river and the substrate and may also cause night time drops in oxygen at the water-sediment interface. The open water must be of high quality with very low nutrient concentrations, in order to limit algal and macrophyte growth. Nutrient levels must be close to the reference levels for the river they inhabit. Phosphorus must never reach values that could allow for sustained, excessive filamentous algal growth. The presence of sufficient salmonid fish to carry the larval glochidial stage of the pearl mussel life cycle is essential.</p> <p>A number of surveys have identified numerous pearl mussel colonies in the environs of the Banteer WWTP, at Ballymaquirk and Dromcummer. Reproductive success in this population is negligible, owing to historic pollution of the river and ongoing elevated inorganic nutrient levels in the water column.</p> <p>The Banteer WWTP produces a generally good quality effluent that is unlikely to affect any of the qualifying interests through direct deoxygenation of the river or accumulation of sediment. However, the plant does not feature nitrogen/phosphate removal as part of its</p>

	<p>treatment process. Where there is a lack of sufficient assimilative capacity for such nutrients, measurable increases in inorganic material will occur. This will directly impact the reproductive capacity of Pearl Mussels.</p> <p>In relation to the other qualifying species of the Blackwater cSAC, 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. Such changes are likely to affect stocks of salmon within the river, a qualifying species that is already under pressure in the catchment. Lamprey, which also require high water quality with low levels of sediment are also likely to be similarly affected. Overall Q-ratings in this stretch of the Blackwater are high, indicating that such negative impacts are insignificant here.</p> <p>Reduction or changes in overall fish stocks will have subsequent effects on predators, most notably otter, for which the site is also designated. 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. Elevated levels of suspended solids from effluent discharges pose a risk to salmon and lamprey recruitment where settlement on spawning gravels and/or redds may occur.</p> <p>As the Banteer discharge is compliant for oxygen loading and suspended solids, these negative effects are not considered likely; the Blackwater at this location is a large waterbody with good dilution levels and displaying high ecological status. No measureable increase in the key Orthophosphate concentration for Pearl Mussels has been identified by sampling.</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>The key ecological relationships that define the structure and function of the Blackwater River as part of the cSAC as a whole are likely to be impacted by potential nutrient enrichment. However, given the minor scale of the discharge, systemic disturbance is not envisaged.</p> <p>The critical matter relating to the Banteer discharge concerns the threat posed to remnant Freshwater Pearl Mussel populations found in the Blackwater downstream in the vicinity of the discharge. EPA sampling of the Blackwater itself downstream of this point, at Dromcummer indicates that the river displays High ecological status (Q=4-5). This high status is unchanged from upstream of the confluence of the Blackwater with the Allow, which feeds in nutrients from the nearest large settlement, Kanturk. Cork Co Co sampling downstream of the Banteer WWTP discharge on the Blackwater indicate that Orthophosphate concentrations remain below 0.05mg/l at this location.</p> <p>The Blackwater remains an open Salmon fishery, indicating Inland Fisheries Ireland's opinion that the species remains in harvestable surplus for the catchment. The assimilative capacity of the Blackwater for nutrients is high overall, but localised deoxygenation of the water column or clogging of the waterbody with macroalgae and macrophytes may be considered a significant impact to migrating and spawning salmon. Lampreys are known to require equitable water quality standards to salmon. These species are unlikely to be affected by the Banteer discharge, as sampling indicates that Q ratings are good downstream of the plant.</p> <p>Reduction in key diet species such as salmonids may negatively affect</p>

	<p>other populations in the catchment. Competition with the invasive non-native mink may act in combination in this regard. Again, such impacts downstream of the Kanturk discharge are considered unlikely, as the effluent is overall compliant with UWWT regulations.</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>Overall, the Banteer WWTP generates UWWT compliant effluent, and is underloaded by some degree. However, only secondary treatment is currently applied.</p> <p>The Freshwater Pearl Mussel Sub-basin Plan makes specific reference to investigating the need for upgrade due to overloading and installing nutrient removal at the plant, owing to the proximal downstream presence of pearl mussels. However, no increase in nutrient loading is currently observed in the Blackwater. Cork County Council have reported that the plant could be upgraded in the future via adjacent land purchase should overloading become an issue.</p> <p>There are currently no plans in place to upgrade the plant to tertiary treatment. Ongoing monitoring of the inorganic nutrient levels in the effluent and downstream of the WWTP is recommended.</p>
<p>Conclusion</p>	<p>The main Blackwater channel displays high ecological status downstream of the Allow and Glen River confluences. Sampling of the river downstream of the Banteer WWTP indicates that the river displays high status for BOD, Ammonia and Orthophosphate. As such, it may appear that the minor nutrient input from this plant is not leading to negative ecological impacts.</p> <p>Given that high ecological conditions prevail in the Blackwater around the Allow and Glen River confluences, it is reasonable to suggest that the dilution factors and assimilative capacity in the Blackwater at this location are sufficiently high to absorb any low levels of phosphate and/or ammonia. Pearl Mussel populations in the immediate area are therefore unlikely to be impacted to any major degree along this stretch of the Blackwater. This takes into account the potential cumulative influence of the WWTP in Kanturk and other such pressures.</p> <p>The assessment therefore concludes that, at present, potential impacts to the cSAC resulting from the Banteer discharge are not considered to be significant, given the excellent status of the Blackwater downstream of the WWTP and the lack of any measurable change in water chemistry. The plant should however be closely monitored for changes to this situation due to increased loading or increases in phosphate/ammonia levels in the effluent.</p>

Appendix 5 – Boherbue Screening

EPA Ref: D0437-01

Project	
Location	Discharge associated with agglomeration of Boherbue village, County Cork.
Distance from designated site	0km: WWTP discharges to the Brogeen River, inside the cSAC boundary.
Brief description	<p>Boherbue is situated on the R577 regional road linking northwest Cork to the Tralee/Castleisland area. The village located approximately 65km from Cork City, has a wide range of existing services, all of which form part of the social and economic infrastructure for a wide rural hinterland.</p> <p>The wastewater in Boherbue is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant.</p> <p>Boherbue WWTP is designed for a Population Equivalent (PE) of 800, which was commissioned in 1955. Extended Aeration is the process employed at the Boherbue waste water treatment plant. Influent initially gravitates into an inlet works consisting of an overflow chamber, grit trap & automatic screen, from where the effluent gravitates on to the Imhoff Tank for primary treatment, which is a hopper bottomed settling tank. Following the primary settlement stage the effluent gravities to the 2 Nr Percolating Filters. The final settlement takes place following the percolating Filters in 2 Nr Humus Tanks.</p> <p>From the Humus Tanks the effluent is discharged to the adjacent recently constructed Wetlands for Tertiary Treatment, following which effluent discharges to the River Brogeen at the boundary of the WWTP Site. The plant is operating near capacity, though sampling indicates that water flowing from the wetland is of excellent quality.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening	
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>The Boherbue agglomeration receives tertiary treatment via a constructed wetland at the main WWTP, before discharging to the Brogeen River. The effluent then disperses in the water column.</p> <p>An observation of the Brogeen River downstream of the WWTP revealed that at this location, the river is very minor in scale (1-2m wide) with slow flows and occasional riffles along a shallow incline.</p>

The most recent EPA water quality sampling data from 2009 indicates that the Brogeen River displays good (Q=4) ecological conditions downstream of the discharge point. Agricultural pollution is still an issue upstream of Boherbue; the EPA report that farmyard run-off is leading to very poor conditions in the headwaters of the river. Recovery of the water quality is apparent at Brogeen Bridge, downstream of Boherbue.

When the agriculturally polluted upstream sampling point is excluded, the river was identified by the EPA as satisfactory with Good and High ecological quality results.

Mean sampling data for the discharge provided by Cork County Council with for dates between 2006 and 2008 is as follows, in mg/l:

- BOD = 2.7
- SS = 4
- COD = 43
- P = 1.6
- N = 2.9

Sampling results of the Brogeen River provided with the Licence Application indicate that the river is under pressure from the agricultural sources further upstream; BOD loading was frequently above 3mg/l upstream and downstream of Boherbue (Moderate WFD status). Mean sampling results between 2006 and 2009 indicate that despite this pressure, High and Good WFD status prevails downstream of Boherbue.

The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in significantly lower concentrations than if no treatment were to be applied.

Under consultation, Inland Fisheries Ireland made reference to the Boherbue WWTP, noting the fact that the plant is technically overloaded. However, no evidence of impact apparent and the constructed wetland appears to be functioning well.

The Water Framework Directive assigns 'Good' status to the Brogeen River; this is based on good EPA results for Macroinvertebrate diversity and High results for Physiochemical status.

The Second Draft Freshwater Pearl Mussel Sub-Basin Plan lists the Boherbue WWTP as potentially having an adverse effect on the pearl mussel. However, this assessment is based on fact that the plant is operating near capacity; the tertiary wetland in place at the plant is operating well and removing significant nutrients from the effluent. The Kanturk WWTP lies just upstream of the confluence of the Brogeen with the Allow and is reported by IFI to be causing over enrichment of the Allow with slight gross organic matter immediately below the outfall point, suggesting nutrient removal performance may need to be revised; however, the EPA report that good ecological conditions persist very closely downstream to this point, indicating very rapid biological recovery. As the Boherbue effluent is of good quality and only good and high ecological conditions are recorded between Boherbue and the Allow confluence, it is not predicted that these two WWTPs are acting in a cumulative manner.

No other WWTPs or commercial discharges occur along the Brogeen River. The agricultural pressures on the headwaters of the river are to be investigated by the Department of Agriculture.

<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>EPA data for the Allow catchment indicates generally satisfactory conditions throughout, with only polluted conditions occurring in the vicinity of poor agricultural practices. It is predicted that the Boherbue discharge is not acting in combination with the other WWTPs in the catchment (such as Kanturk) to negatively influence water quality in the catchment. Some very localised reduction water quality has been reported by IFI around the Kanturk outfall, but EPA records very closely downstream indicate good ecological status; the Brogeen and Allow thus appear to have high rates of biological recovery and high assimilative capacities.</p> <p>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. Such implementation should improve the situation regarding the discontinuous pollution of the Brogeen headwaters.</p> <p>The IRD Duhallow LIFE project entitled 'Restoration of the Upper River Blackwater SAC for the Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>), Atlantic Salmon (<i>Salmo salar</i>), European Otter (<i>Lutra lutra</i>) and Kingfisher (<i>Alcedo atthis</i>)' aims to improve habitat quality in the Allow catchment. This is likely to have a beneficial effect via reducing land-based pressures on the river, and may help negate some of the enrichment pressures described above. A key deliverable is the</p>
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	<p>promotion of cattle fencing along the river to prevent further siltation and pollution of the river. This will act cumulatively with the WWTPs in the region to reduce negative pressures in the Allow sub-catchment.</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; Climate change.</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 Dalua at 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 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 - Records in main Blackwater channel only exist near Fermoy. The species has also been historically recorded in the Awbeg sub-catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter.</p> <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. The compliant Boherbue discharge is very small in scale in relation to the overall context and watershed of the Blackwater catchment. Given that such populations are over 15km downstream and that the discharge is contributing minimal eutrophying nutrients to the Allow sub-catchment, it is highly unlikely that pearl mussel populations in the main Blackwater channel are negatively influenced by the Boherbue WWTP.</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.</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 species which have also been recorded in the Allow Catchment. The Brogeen displays rapid ecological recovery from agricultural pressures in its headwaters and no evidence of river substrate enrichment was observed during field surveys. Such impacts are considered unlikely.</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.</p>

	<p>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 overall Blackwater catchment is under threat from a variety of sources, including run-off from intensive agriculture, especially in the well known agricultural area known as the Golden Vale. Nutrient run-off, sedimentation and acidification from forestry also put pressure on the river further up its reaches, where substantial areas of the catchment are under coniferous cover. Up until recently, the level of treatment of sewage being discharged to the river Blackwater 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 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.</p> <p>The levels of organic and inorganic nutrients contained within the Boherbue discharge are notably small, and the effluent is compliant with the UWWT regulations. Such high quality effluent may be negating the influence of poor agricultural pressures higher up in the Brogeen River.</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>In the context of other discharges to the Allow catchment, the Boherbue plant generates a compliant effluent in relatively low volumes. The river is currently considered to be in good ecological condition.</p> <p>Other negative pressures to the qualifying interests of the cSAC may be resulting from other land uses (primarily agriculture) in the area. The Duhallow LIFE project aims to target agricultural pressures in the Allow River and thus further reduce negative cumulative pressures on the wider catchment.</p> <p>The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Boherbue discharge are envisaged and therefore no further assessment is required.</p>

Appendix 6 – Buttevant Screening

EPA Ref: D0303-01

Project	
Location	Discharge associated with agglomeration of Buttevant village, County Cork.
Distance from designated site	0km: WWTP discharges to the Awbeg River, at the cSAC boundary.
Brief description	<p>Buttevant is located on the main Cork-Limerick (N20), 11km north of Mallow and 7km west of Doneraile. The village is located in an area, which is generally referred to as the 'Golden Vale', which comprise an extensive area of predominately flat or undulating topography along the Blackwater valley. The census of 1996 indicated a population of 1,070, while the census of 2002 showed a population of 987.</p> <p>The wastewater in Buttevant is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant.</p> <p>Buttevant WWTP is designed for a Population Equivalent (PE) of 3,150 which was commissioned in early 2009. Activated Sludge is the process employed at the Buttevant waste water treatment plant. Influent initially is pumped from either of the Pumping Stations in operation to the inlet works at the plant. The inlet works consists of 2 Nr automatic screens followed by a grit trap and grit classifier. From the inlet works influent gravitates to the inlet sump, from which the influent is pumped forward via duty/standby pumps to one of the Sequential Batch Reactors. The system is designed to allow fill and aeration for a preset time and once the preset time for fill and aerate is complete, settlement stage commences. Following settlement, the treated effluent is discharged from the balance tank to the outfall works, which consists of an open channel flume and a composite sampler.</p> <p>The reduction in the phosphorous content of the effluent is carried out by the addition of Ferric Sulphate.</p> <p>The pollution load for the Buttevant agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & crèches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. The final effluent is discharged to the Awbeg River, which is adjacent to the wastewater treatment plant site.</p> <p>The WWTP currently serves a PE of 1700 and is therefore significantly underloaded.</p>

<p>Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?</p>	<p>No</p>
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<p>Stage 1 - Screening</p>	
<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 Buttevant agglomeration receives tertiary treatment at the new WWTP, before discharging to the Awbeg River. The effluent then disperses in the water column.</p> <p>An observation of the Awbeg downstream of the WWTP revealed that at this location, the river is quite wide in scale (6-10m wide) with moderate flows over occasional riffles along a shallow incline. Frequent patches of aquatic macrophytes were observed, including Water crowfoot and Fool's watercress; no algal mats were observed. Water quality appeared in good condition.</p> <p>The most recent EPA water quality sampling data from 2009 indicates that the Awbeg River displays good (Q=4) ecological conditions downstream of the discharge point, at Cahermee Bridge.</p> <p>The overall ecological status of the Lower Awbeg catchment is listed by the EPA as satisfactory with good ecological conditions prevailing. The EPA previously noted poor water quality downstream of Buttevant, this being associated with stormwater overflows. Following the recent upgrade, such issues are now considered to be unlikely. IFI have subsequently reported a notable improvement in river substrate conditions since these upgrade works at Buttevant WWTP.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application from 2009 indicates the following effluent levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = <2 • SS = 4 • COD = 17 • P = 0.08 • N = 8.5 <p>These are excellent values for a treatment plant on the scale of Buttevant.</p> <p>The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.</p> <p>The Water Framework Directive assigns 'Poor' status to this sub-catchment of the Awbeg; this is based on results for aquatic macroinvertebrate diversity found in this area, most recently in early 2009. It is predicted that an improvement in overall water quality conditions downstream of Buttevant and Doneraile will have occurred since this status was applied, as both these agglomerations have had recent upgrades to their WWTPs, to include tertiary treatment.</p> <p>Freshwater Pearl Mussel are not known from this sub-catchment. However, White-clawed crayfish have been historically observed in the</p>

	<p>Awbeg River (though EPA surveys during 2009 did not record any such specimens).</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>Buttevant is a small scale urban centre surrounded by agricultural pasture lands; the banks of the Awbeg downstream of Buttevant are dominated by mature broadleaf woodland which is likely to buffer against any fertilizer run-off from surrounding pasture.</p> <p>Other WWTP discharges located in the immediate part of the catchment are the Doneraile, Castletownroche and Shanballymore WWTPs downstream. No other major industrial discharges occur in this stretch of the Awbeg and the only other major cumulative pressure is considered to come from agriculture.</p> <p>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. It is this programme which is likely to have most significantly accounted for the improvement in water quality observed in the upper Awbeg in recent years. This is likely to act in conjunction with the Buttevant and Doneraile WWTP upgrades to further improve water quality in the Awbeg catchment.</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; Climate change.</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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, White-clawed Crayfish, Atlantic salmon 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 other populations within the sub-catchment and may reduce the carrying capacity of the constituent rivers.</p> <p>Crayfish sensitivity to changes in water quality can result in significant losses following pollution incidents. Eutrophication can lead to luxuriant plant growth, which in turn traps silt and can result in deoxygenation at night, leading to loss of crayfish habitat. No crayfish were encountered in the Awbeg during EPA 2009 surveys, but it is not clear whether this is indicative of a loss of the population, as no species-specific surveying has been carried out.</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, and also reduce the recruitment success of White-clawed crayfish.</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.</p> <p>The Buttevant plant is currently significantly underloaded and generating a high quality effluent with low nutrient concentrations. The Awbeg is a large waterbody at this location with good ecological conditions now prevailing along its length. Recent improvement of the river substrate downstream of Buttevant has been noted by IFI.</p> <p>An overall improvement in ecological conditions has been observed in the upper Awbeg in recent years, with only poor results from 2006 and 2009 being noted by the EPA in Buttevant and Doneraile. As previously stated, both these plants have now been upgraded to tertiary treatment and are no longer expected to be contributing to poor water quality. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and White-clawed crayfish).</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 Buttevant WWTP is a modern installation and is generating an excellent effluent for the scale of the plant. The addition of efficient tertiary treatment means that it is unlikely to be contributing to significant nutrient input to the overall Awbeg River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.</p> <p>In the context of other discharges to the Awbeg in the overall vicinity, the Doneraile WWTP has also been recently upgraded to tertiary treatment and will be contributing to an improvement in water quality in the catchment. The Shanballymore WWTP also produces a generally compliant effluent; an upgrade for this plant is also planned in the near future. It is therefore not considered that the Buttevant WWTP is acting in combination with other pressures to any significant degree.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Buttevant discharge are envisaged and therefore no further assessment is required.</p>

Appendix 7 – Bweeng Screening

EPA Ref: D0438-01

Project	
Location	Discharge associated with agglomeration of Bweeng village, County Cork.
Distance from designated site	12km: WWTP discharges to a percolation area in the watershed of the Cummeen Stream, a tributary of the Clyda River, upstream of the cSAC boundary.
Brief description	<p>The village of Bweeng is located on the Southern end of Mallow Area. It is situated on the R619 regional road and is approximately 20km from Mallow Town.</p> <p>The wastewater in Bweeng is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant.</p> <p>Bweeng WWTP is designed for a Population Equivalent (PE) of 500, which was commissioned in 2007. Membrane Technology is the process employed at the Bweeng waste water treatment plant. Influent initially gravitates into an underground inlet sump via an automatic screen and flume. From the inlet sump the effluent is pumped to a Primary Settlement Tank, which effluent is allowed to settle. The effluent then flows into the adjacent MBR tank for further treatment by means of membrane treatment.</p> <p>The pollution load for the Bweeng agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. The final effluent is discharged to a constructed percolation area which is adjacent to the wastewater treatment plant site. This then passes via groundwater to the Cummeen Stream.</p> <p>The plant currently services a PE of 500, based on hydraulic loading and is therefore operating at design capacity.</p> <p>An additional upgrade is planned in the form of tertiary filters.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

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 Bweeng agglomeration receives tertiary treatment at the WWTP, before discharging to the percolation area in the vicinity of a tributary of the Cummeen Stream, a tributary of the River Clyda and River Blackwater. The effluent then disperses in the water column.</p> <p>The Cummeen Stream to which some of the percolated discharge will reach via groundwater is very minor scale (~ 1m wide), but running down a step incline over numerous falls. It is expected to have a high assimilative capacity for oxygen loading and is naturally oligotrophic.</p> <p>EPA sampling of the Cummeen Stream and Ahadallane Rivers indicates that both display High ecological quality at all tested locations. However, the WFD classification for the sub-catchment is only 'Moderate', based on decreased status for fish populations in the closely associated Glashaboy River.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following effluent levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = 5 • SS = 3 • COD = <21 • P = 1.21 • N = 0.16 <p>As this discharge flows to groundwater, no upstream or downstream sampling generally applies. Sampling of the Cummeen stream in the area of groundwater influence indicated 'High' status for BOD, Ammonia and Orthophosphate.</p> <p>The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Bweeng WWTP.</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.; 	<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>Others.</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>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.</p> <p>The surrounding land use is primarily upland pasture and commercial forestry. Fertilizer run-off from agricultural land is likely to be low in this region. Nitrate release during forestry operations can lead to reduction in water quality in rivers like the Cummeen Stream; however, no such impacts were noted during field surveys.</p> <p>The plant lies in the same sub-catchment (Clyda) as the Dromohane WWTP. Given the geographical separation of the two sites and the high quality effluent of the Bweeng plant, the two plants are not expected to act in combination in a negative manner.</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; Climate change.</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 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 – Not found in upland peaty and acidic rivers such as the Clyda River/Cummeen Stream <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing</p>

	<p>eutrophication leads to progressive ageing of populations and associated reduction in density. There are pearl mussel populations in the main Blackwater channel downstream of the Clyda River confluence, in the environs of Mallow town. The Bweeng plant is relatively minor in scale, generates a high quality effluent with low inorganic nutrient levels and is 18km upstream of the existing Blackwater populations.</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. Water quality in the Cummeen Stream was observed to be high with no evidence of eutrophication.</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 species which have also been recorded in the overall Blackwater catchment. Some macrophytes were observed in the Cummeen Stream and Ahadallane River, but these were not considered to be a result of eutrophication.</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 implementation of the Nitrates Directive has addressed this nutrient input to a major degree. No evidence of negative pressure from forestry in the area was observed.</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.</p> <p>The Bweeng plant is a modern plant which is not overloaded and generates a very high quality effluent that percolates to groundwater and thus acts as a diffuse pressure of minimal impact to the Cummeen Stream. High biological water quality is recorded in all sampling stations of the receiving water, and it is not considered to be at risk of eutrophication.</p> <p>The Dromahane WWTP lies just upstream of a series of Freshwater Pearl Mussel populations in the River Blackwater and while generating a UWWT-compliant effluent, total phosphate levels are quite high and may be contributing to poor water status for this species. Tertiary treatment at the Bweeng plant is effectively minimising the degree of</p>

	<p>inorganic nutrients entering the Clyda catchment and thus it is not considered to be contributing to the situation downstream of Dromahane.</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>In the context of other discharges to the Blackwater in the overall vicinity, the contemporary Bweeng plant generates a high quality effluent with low nutrient levels. This percolates to groundwater and the remaining nutrients in the effluent will be slowly diffused to the Cummeen Stream. The upper streams of the Clyda catchment appear to maintain a generally low-nutrient character; this is contributed to by the implementation of the Nitrates Directive.</p> <p>Given the small scale of the Bweeng discharge, and the excellent quality of effluent it generates, it is not seen as significant negative pressure. The Dromahane WWTP is a considerable distance downstream of Bweeng; it is not considered that the Bweeng plant is contributing to phosphate elevation downstream of Dromahane.</p> <p>The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Bweeng discharge are envisaged and therefore no further assessment is required.</p>

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Appendix 8 – Castlelyons Screening

EPA Ref: D0449-01

Project	
Location	Discharge associated with agglomeration of Castlelyons village, County Cork.
Distance from designated site	1km: WWTP discharges to the Shanowennadrimina Stream, upstream of the cSAC boundary.
Brief description	<p>Castlelyons is situated 3km east of the village of Rathcormack and the historic settlement of Castlelyons is approximately 1km away from the village of Bridesbridge. The village is well developed from the point of public services such as a primary school, shops and amenities.</p> <p>The wastewater in Castlelyons is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant. Castlelyons WWTP is designed for a Population Equivalent (PE) of 1,200, which was commissioned in 2007. Activated Sludge is the process employed at the Castlelyons wastewater treatment plant. Influent initially gravitates into the inlet works, which consists of an automatic screen, measurement flume and a circular concrete inlet sump, from where the effluent is pumped to an above ground circular aeration tank. The effluent then flows into the adjacent circular clarifier. The solids settle while the supernatant flows over the weir and discharges via the outflow flume to the adjacent stream.</p> <p>The pollution load for the Castlelyons agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. The final effluent is discharged to the Shanowennadrimina Stream, which is adjacent to the wastewater treatment plant site.</p> <p>The WWTP currently treats an agglomeration PE of 400 and is therefore significantly underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening

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.

The Castleyons agglomeration receives tertiary treatment at the WWTP, before discharging to the Shanowennadrimina Stream, a tributary of the River Bride. The effluent then disperses in the water column.

An observation of the Shanowennadrimina Stream downstream of the discharge revealed that at this location, the stream is very minor in scale (2m wide) with slow flows over occasional riffles along a shallow incline. Some patches of aquatic macrophytes were observed, with stands of watercress and fool's watercress. Water quality appeared high with good open gravel substrate.

No EPA sampling has historically taken place in the Shanowennadrimina Stream. However, the most recent EPA water quality sampling data from 2009 indicates that the River Bride displays good (Q=4) ecological conditions upstream and downstream of the Shanowennadrimina Stream confluence.

The overall ecological status of the River Bride is listed by the EPA as improved with good ecological conditions at all stations sampled in 2009. This improvement relates to slightly polluted conditions near Shanbally in 2003; farmyard slurry was reaching a nearby stream at the time of the survey. The river was also moderately polluted, due to sewage discharges, on left-hand-side of river below Bridebridge and slightly polluted at Bealacoon Foot-bridge. This pollution record from 2003 is considered related to the Bridebridge WWTP which has also been upgraded in recent years.

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

- BOD = 5
- SS = 16
- COD = 51
- P = 2.2
- N = 17

These are compliant values for BOD, SS and COD. Sampling of the Shanowennadrimina Stream indicated no perceived changes to BOD, Ammonia or Orthophosphate in the receiving water, which is classified as High Status under the WFD system.

The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.

Under consultation, Inland Fisheries Ireland made no reference to the Castleyons WWTP as having a negative influence on fisheries in the catchment.

The Water Framework Directive assigns 'Moderate' status to this stretch of the Shanowennadrimina Stream; this is based on an assignment of Moderate aquatic macroinvertebrate diversity found in this area. Macroinvertebrate status is likely to have improved significantly in the area since the commissioning of the upgraded Castleyons and Bridebridge WWTPs.

<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>In relation to the above points, no changes in the trophic status of the receiving water have been recorded due to the high quality effluent of the Castle Lyons plant.</p> <p>In relation to cumulative impacts, the Castle Lyons WWTP lies in close proximity to the Bridebridge WWTP which has also been recently upgraded and is underloaded; it is also to be further upgraded with additional diffusers. No cumulative impacts are envisaged from these two plants. Further upgrades at Bridebridge are planned; diffusers are also to be added to the WWTP in the near future.</p> <p>The WWTP also lies downstream of Rathcormack WWTP and upstream of the Conna WWTP, which both release high quality low-nutrient discharges. The Rathcormack plant is a very recently commission and also involves tertiary treatment.</p> <p>Conna Regional Water Treatment Plant also lies downstream of Bridebridge; the abstraction at this location may reduce the assimilative capacity of the Bride by a small degree, but this is not considered to be an issue given the fact that the Bride WWTPs all generate high quality effluent.</p> <p>The surrounding land use is primarily agricultural pasture. 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</p>
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	<p>nutrient management has improved dramatically due to participation in REPS and more recently, to the Nitrates Action Programme. Reduction in slurry usage in the Bride catchment appears to have contributed to an improvement in water quality in recent years.</p> <p>The River Bride was closed to salmon and sea trout fishing in 2010, but is to be re-opened on a catch-release basis in 2011. Inland Fisheries Ireland therefore consider the Bride population to be improved from previous years, but not yet in harvestable surplus. The improvement in sewage discharge to the middle stretches of the Bride from the upgrades to the Castlelyons, Bridebridge and Rathcormack WWTPs are likely to be significantly contributing to the recovery of salmon populations in the river; this is a positive impact.</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; Climate change.</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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. <p>White-clawed Crayfish – Historically not recorded from the Bride catchment.</p> <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Atlantic salmon 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. No evidence of excessive BOD loading has been recorded in the Shanowennadrimina Stream.</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. Some watercress was observed in the Shanowennadrimina Stream, and a significant degree of floating river vegetation was observed in the River Bride at both Bridebridge and Achern Bridge. No gross eutrophication in the form of algal mats was observed. The presence of the current levels of vegetation may be attributed to historical phosphorus and nitrate input to the respective rivers, the effects of which will take several years to dissipate; levels of in-stream vegetation are predicted to fall over the coming years. Between the vegetation, the river substrate was observed to be open and no barriers to fish migration were recorded.</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 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.</p> <p>The Castlelyons plant is currently underloaded and generating a good quality effluent. There is a lack of EPA sampling data in the immediate environs of the plant, though Cork Co Co sampling indicates very high water quality downstream of the plant. Inland Fisheries Ireland did not raise any specific concerns relating to the discharge, and no evidence of gross eutrophication was observed (this being the main pressure on the wider Blackwater catchment). An overall improvement in ecological conditions has been observed in the River Bride in recent years, attributable to the upgrade to WWTPs in the catchment and improved agricultural practices along the river. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and Otter).</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 Castlelyons plant is significantly underloaded and in relation to the overall size of the catchment, the agglomeration is very small with minimal flows and is therefore unlikely to be contributing to significant nutrient input to the overall Bride River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.</p> <p>The nearby Bridebridge plant has also been recently upgraded and is underloaded; it is not predicted to be acting in conjunction with the Castlelyons WWTP to a significant degree. It is noted that the Bridebridge plant is to be further upgraded with additional diffusers. The river is currently considered to be in satisfactory ecological condition with good ecological conditions recorded upstream and downstream of the discharge. Inland Fisheries Ireland also have no concerns relating to the discharge. Qualifying interests which have the highest ecological sensitivity (Crayfish and Pearl Mussel) are not found in this sub-catchment.</p> <p>The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Castlelyons discharge are envisaged and as such no further assessment is required.</p>

Appendix 9 – Castletownroche Screening

EPA Ref: D0293-01

Project	
Location	Discharge associated with agglomeration of Castletownroche village, County Cork.
Distance from designated site	0km: WWTP discharges to the Awbeg River, inside the cSAC boundary.
Brief description	<p>Castletownroche is a village located on the N72 national route and is 29km northeast of Cork City. The village lies between the towns of Fermoy and Mallow, in an area generally referred to as the 'Golden Vale'.</p> <p>The wastewater in Castletownroche is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant.</p> <p>Castletownroche WWTP is designed for a Population Equivalent (PE) of 1,000, which was commissioned in late 1999. Activated Sludge is the process employed at the Castletownroche waste water treatment plant. Influent initially gravitates into a grit trap, which is followed by an inline muncher. From here the influent enters the inlet sump, from where the influent is pumped to a steel circular aeration tank. The effluent then flows into the settling tank with rotating half bridge scrapper. The solids settle while the supernatant flows over the weir and discharges via V-notch Box to the river. Sludge maybe returned from the settling tank to the aeration tank and excess sludge is removed from the settling tank as required to the Sludge Holding Tank.</p> <p>The pollution load for the Doneraile agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & crèches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. The final effluent is discharged to the Awbeg River, which is adjacent to the wastewater treatment plant site.</p> <p>The WWTP currently serves a PE of 900 (based on hydraulic flow) and is therefore slightly underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening

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.

The Castletownroche agglomeration receives secondary treatment at the WWTP, before discharging to the Awbeg River. The effluent then disperses in the water column.

An observation of the Awbeg downstream of the WWTP revealed that at this location, the river is quite wide in scale (>10m wide) with moderate flows over occasional riffles along a shallow incline. Frequent patches of aquatic macrophytes were present though no algal mats were observed. Water quality appeared in good condition.

The most recent EPA water quality sampling data from 2009 indicates that the Awbeg River displays good (Q=4) ecological conditions downstream of the discharge point, at Kilcummer Bridge.

The overall ecological status of the Lower Awbeg catchment is listed by the EPA in its 2009 report as satisfactory with good ecological conditions prevailing, apart from upstream at Buttevant which, although improved from recent years, was less than satisfactory due apparently to storm-overflow of sewage discharges. Buttevant was upgraded in 2009/10 to a PE to a design PE of 3150, and is now significantly underloaded; such issues associated with storm overflows are now considered to be unlikely. IFI have subsequently reported a notable improvement in river substrate conditions since these upgrade works at Buttevant. Doneraile has also been similarly upgraded.

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 = 76
- SS = 43
- COD = 141
- P = 2.3
- N = 17

These are non-compliant values according to the UWWT regulations. Mean values for 2008/09 indicate similar non-compliant averages for the discharge.

Despite this non-compliance, there is no measurable increase in Nitrogen or Phosphorus between upstream and downstream sampling points in Castletownroche. BOD was seen to double from 1mg/l to 2mg/l, though the Awbeg at this location is predicted to exhibit rapid biological recovery as it has a high assimilative capacity for oxygen loading. The Awbeg has been recorded as displaying 'High' status for BOD, Ammonia and Orthophosphate, indicating that despite being over the requisite UWWT thresholds, the Castletownroche discharge has no significant impact on water quality in the Awbeg.

The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.

Under consultation, Inland Fisheries Ireland made no reference to the Castletownroche WWTP, as the plant is underloaded and should technically be generating good quality effluent.

The Water Framework Directive assigns 'Poor' status to this sub-catchment of the Awbeg; this is based on results for aquatic macroinvertebrate diversity found in this area, most recently in early

	<p>2009. It is predicted that an improvement in overall water quality conditions downstream of Buttevant and Doneraile will have occurred since this status was applied, as both these agglomerations have had recent upgrades to their WWTPs, to include tertiary treatment.</p> <p>Freshwater Pearl Mussel are not known from this sub-catchment. However, White-clawed crayfish have been historically observed in the Awbeg River (though EPA surveys during 2009 did not record any such specimens).</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>The surrounding land use is primarily agricultural pasture and estate woodland; the banks of the Awbeg at this location are dominated by mature riparian treelines which is likely to buffer against any fertilizer run-off from surrounding pasture.</p> <p>Other WWTP discharges located in the immediate part of the catchment are the Buttevant, Doneraile and Shanballymore WWTPs upstream of this location. No other major industrial discharges occur in this stretch of the Awbeg and the only other major cumulative pressure is considered to come from agriculture. A number of public water supplies occur in the vicinity, but these are spring fed and do not abstract water from the Awbeg.</p> <p>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</p>

	<p>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.</p> <p>It is this programme which is likely to have most significantly accounted for the improvement in water quality observed in the upper Awbeg in recent years. This is likely to act in conjunction with the Buttevant and Doneraile WWTP upgrades to further improve water quality in the Awbeg catchment. This cumulative influence is likely to be contributing to improved assimilative capacity of the Awbeg, thereby buffering the river against the potential negative impacts of the non-compliant Castletownroche discharge.</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; Climate change.</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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, White-clawed Crayfish, Atlantic salmon 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>Crayfish sensitivity to changes in water quality can result in significant losses following pollution incidents. Eutrophication can lead to luxuriant plant growth, which in turn traps silt and can result in deoxygenation at night, leading to loss of crayfish habitat. No crayfish were encountered in the Awbeg during EPA 2009 surveys, but it is not clear whether this is indicative of a loss of the population, as no species-specific surveying has been carried out.</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, and also reduce the recruitment success of White-clawed crayfish.</p> <p>Nutrient input does not appear to be major issue in the Lower Awbeg. Increased oxygen loading downstream of the Castletownroche WWTP is also of low impact, as the river maintains 'High' WFD status for this</p>

	<p>variable. Ni impacts to salmonids, lamprey and crayfish are therefore envisaged.</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 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.</p> <p>The Castletownroche WWTP is not presently overload, but generates a non-compliant effluent. However, the Awbeg is a large waterbody at this location with good ecological conditions now prevailing along its length. No evidence of gross eutrophication downstream of the plant was observed in the Awbeg during field surveys.</p> <p>An overall improvement in ecological conditions has been observed in the upper Awbeg in recent years, with only poor results from 2006 and 2009 being noted by the EPA in Buttevant and Doneraile. Both these plants have been recently upgraded to tertiary treatment and are no longer expected to be contributing to poor water quality. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and White-clawed crayfish). The assimilative capacity of the Awbeg for the non-compliant Castletownroche discharge is therefore increased.</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 Castletownroche WWTP is currently suffering from non-compliant effluent, despite being underloaded. However, downstream sampling indicates that the discharge has no measurable effect on water quality.</p> <p>The assimilative capacity of the Awbeg has significantly improved in recent years due to the upgrade of the other major WWTPs along the Awbeg (Buttevant and Doneraile). The addition of tertiary treatment at these plants has led to notable improvement in water quality. These upgrades are acting cumulatively to negate the potential negative impact of the non-compliant Castletownroche WWTP. The Shanballymore WWTP also produces a generally compliant effluent; an upgrade for this plant is also planned in the near future. Due to this reduction in negative cumulative pressures along the Awbeg, it is envisaged that the Castletownroche WWTP is not leading to a decrease in water quality in</p>

	<p>the lower stretch of the river. Assimilative calculations have indicated that the plant currently only leads to an 0.002mg/l increase in Orthophosphate, which is not considered significant in relation to input to the main Blackwater channel to which the Awbeg flows.</p> <p>Cork County Council is currently considering making use of the former Castletownroche septic tank which remains unused on the site of the WWTP. The tank may be incorporated into the treatment process as a primary settlement and treatment tank, before flowing to the current primary phase of the WWTP. This should result in an even higher quality of effluent.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Castletownroche WWTP discharge are therefore envisaged and thus no further assessment is required.</p>
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Appendix 10 – Churchtown Screening

EPA Ref: D0444-01

Project	
Location	Discharge associated with agglomeration of Churchtown village, County Cork.
Distance from designated site	5.5km: WWTP discharges to a percolation area in the watershed of the Awbeg River, upstream of the cSAC boundary.
Brief description	<p>The wastewater in Churchtown is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the Village gravitates to a pumping station located within the Village from where the effluent is pumped to wastewater treatment plant.</p> <p>Churchtown WWTP is designed for a Population Equivalent (PE) of 1,000, which was commissioned in 2007. Activated Sludge is the process employed at the Churchtown waste water treatment plant. Influent initially gravitates into the inlet works, which consists of an automatic screen, measurement flume and a circular concrete inlet sump, from where the effluent is pumped to an above ground circular aeration tank.</p> <p>The effluent then flows into the adjacent circular clarifier. The solids settle while the supernatant flows over the weir and is directed to the sand filter system. From here the effluent is discharged via an ultraviolet system to a percolation area, which slopes to a stream adjacent to the site boundary. Sludge may be returned from the clarifier to the aeration tank and excess sludge is removed from the clarifier as required to the sludge holding tank. In the event of high storm flows effluent may bypass the plant via the baffle plate at the inlet manhole. During normal storm periods, effluent overflows at the sump to the storm holding tank, which gravitates back to the sump after the sump level reduces. In the event of the storm tank filling, the screened effluent discharges via the outlet pipe.</p> <p>Currently the WWTP is receiving flows ranging from 120m³/d to 300m³/d, with an average DWF of 120m³/d entering the plant. Based average hydraulic load of 200l/d/p, the PE equates to 600.</p> <p>Churchtown WWTP is operated by Cork County Council. The plant is operated by a caretaker whose duties also involve the maintenance of a number of other small WWTP's in the area.</p> <p>The plant is currently underloaded and generates an excellent quality effluent.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

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 Churchtown agglomeration receives tertiary treatment at the WWTP, before discharging to a percolation area beside a tributary stream of the western spur of the Awbeg River. The effluent then disperses in the water column.</p> <p>An observation of the tributary downstream of the discharge revealed that at this location, the stream is very minor in scale (1m wide) with moderate flows down a steady incline.</p> <p>The most recent EPA water quality sampling data from 2009 indicates that the Awbeg River displays good (Q=4) ecological conditions downstream of the discharge point, near Ballynageragh.</p> <p>Conditions in the Awbeg have improved significantly since 2006 when Q values of 3 were recorded further upstream. This improvement coincides with the commissioning of the new Liscarroll package plant in the headwaters of the Awbeg.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following effluent levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = 1.7 • SS = 1.25 • COD = 10.5 • P = 2.97 • N = 20.7 <p>Sampling results of the Churchtown stream taken at the same time show increases in BOD, Ammonia and Orthophosphate, all of which are, as such, afforded moderate status under the WFD classification. However, given the low levels of nutrients recorded in the effluent, it is not considered that they are leading to the observed elevated concentrations; these are likely to be attributable to local agricultural practices.</p> <p>The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Churchtown WWTP.</p> <p>The Water Framework Directive assigns 'Poor' status to this sub-catchment of the Awbeg; this is based on results for aquatic macroinvertebrate diversity in the lower stretches around Buttevant and Doneraile. Water quality downstream of Churchtown is reported by the EPA as good.</p> <p>Freshwater Pearl Mussels are not known from this sub-catchment. However, White-clawed crayfish have been historically observed in the Awbeg River (though EPA surveys during 2009 did not record any such specimens).</p>
<p>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with</p>	<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>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>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>The surrounding land use is primarily agricultural pasture.</p> <p>Other WWTP discharges located in the immediate part of the catchment include the Liscarroll WWTP which also discharges to the western spur of the Awbeg River. This has also been recently upgraded to Tertiary treatment, and the EPA have reported an overall improvement of water quality downstream of this plant. The Ballyhea WWTP discharges to the eastern spur of the Awbeg and also generates a good quality effluent with no discernible impact on water quality.</p> <p>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 is also likely to have accounted for some of the improvement in water quality observed in the Awbeg in recent years.</p>
<p>Describe any likely changes to the site arising as a result of:</p> <ul style="list-style-type: none"> Reduction of habitat area; Disturbance of key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value; Climate change. 	<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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, White-clawed Crayfish, Atlantic salmon 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>Crayfish sensitivity to changes in water quality can result in significant losses following pollution incidents. Eutrophication can lead to luxuriant plant growth, which in turn traps silt and can result in deoxygenation at night, leading to loss of crayfish habitat.</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, and also reduce the recruitment success of White-clawed crayfish.</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 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.</p> <p>The Churchtown plant is a recently commissioned installation with Tertiary treatment which is underloaded and generates a very high quality effluent that is compliant with the UWWT regulations. Furthermore, an</p>

	<p>improvement in ecological conditions in the river has been reported by the EPA immediately downstream of the plant. The Churchtown plant is referenced by the WFD WMU as being a plant 'at risk' due to future insufficient capacity, though in light of the current financial climate, this is not considered to be significant as development is likely to be restricted in the area in coming years.</p> <p>The overall improvement in ecological conditions observed in the upper waters of the western Awbeg spur in recent years is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and White-clawed crayfish). A reduction in water quality observed upstream at Annagh Bridge is likely to be attributable to poor agricultural practices in the area; the well-functioning Churchtown and Liscarroll plants may in fact be contributing to negating against even further degradation of water quality downstream.</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>In the context of other discharges to the Awbeg in the overall vicinity, the contemporary Churchtown plant generates a high quality effluent with low nutrient levels. The river in the vicinity of Churchtown is currently considered to be in satisfactory ecological condition.</p> <p>Other negative pressures to the qualifying interests of the cSAC may be resulting from other land uses (primarily agriculture) in the area. It is considered that the Churchtown WWTP is likely to be negating these negative impacts to some degree by minimising nutrient input from the agglomeration.</p> <p>The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Churchtown discharge are envisaged and therefore no further assessment is required.</p>

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Appendix 11 – Clondulane Screening

EPA Ref: D0450-01

Project	
Location	Discharge associated with agglomeration of Clondulane village, County Cork.
Distance from designated site	1km: WWTP discharges to the Careysville Stream, upstream of the cSAC boundary.
Brief description	<p>Clondulane Village is located on the LI533, circa 4.5 Km East of Fermoy town. The village is well developed from the point of public services such as a primary school, shops and amenities. The waste water from the Clondulane agglomeration is currently treated by a package treatment plant prior to been discharged to the Careysville Stream and the River Blackwater.</p> <p>Clondulane wastewater treatment plant (WWTP) was constructed in 2007 on the site of a pre-existing WWTP which had previously served the village.</p> <p>The main elements of the WWTP are;</p> <ol style="list-style-type: none"> 1. Inlet works: Inlet flume, Automatic screen, forward feeding pump sump. 2. Secondary treatment: Aeration tank, Clarifier 3. Discharge to Careysville stream <p>The wastewater from the village is collected in a partially combined foul and sewer drainage network and gravitates to the wastewater treatment plant. There are two pumps stations located on the network both of which serve small clusters of houses.</p> <p>The pollution load from the Clondulane agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & creches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. There are no industrial waste streams discharging into the sewerage network.</p> <p>The main source of emissions from the works is via a 300mm open pipe outfall to the Careysville Stream.</p> <p>The plant currently services an agglomeration with a PE of 450 and is therefore underloaded.</p>
Is the plan directly connected with or	No

necessary to the Natura 2000 site management for nature conservation?	
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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 Clondulane agglomeration receives secondary treatment at the WWTP, before discharging to the Careysville Stream. The effluent then disperses in the water column.</p> <p>An observation of the Careysville Stream downstream of the WWTP revealed that at this location, the river is relatively minor in scale (~2m wide) with moderate flows over occasional riffles along a shallow incline. Water quality appeared in good condition.</p> <p>The Careysville Stream is not part of the regular EPA sampling regime for the Blackwater catchment. EPA sampling of the Blackwater downstream of the confluence with the Careysville Stream indicates Good ecological conditions at Coleman's Wood. This represents an improvement on 2006 sampling results where only Moderate conditions were found. This corresponds with the upgrade of the Clondulane WWTP, suggesting that this upgrade may have contributed to reducing the degree of inorganic and organic matter entering the Blackwater at this location.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application from 2009 indicates the following effluent levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = 10 • SS = 15 • COD = 52 • P = 5 • N = 59.5 <p>As such, the plant is compliant according to UWWT thresholds. The Careysville Stream is a very minor waterbody with a low assimilative capacity. Despite this, downstream sampling for BOD, Ammonia and Orthophosphate indicates that the stream maintains High or Good WFD status for these variables downstream of the WWTP.</p> <p>The Water Framework Directive currently assigns 'Moderate' status to the receiving stretch of the Blackwater; this automatically assigned to waterbodies containing Freshwater Pearl Mussels with poor reproductive success. The Careysville Stream is not classified in the Blackwater WMU.</p> <p>Under consultation, IFI had no concerns regarding the current effluent from the Clondulane plant.</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: Size and scale; Land-take; Distance from Natura 2000 site or key features of the site;</p>	<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>Resource requirements; Emissions; Excavation requirements; Transportation requirements; Duration of construction, operation etc.;</p> <p>Others.</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>Clondulane is a small village surrounded by agricultural pasture lands. The Careysville Stream is a short waterbody, the source being only 3km to the south. No other surface water discharges occur along the stream and cumulative pressure is minimal.</p> <p>The Careysville Stream enters the Blackwater downstream of Fermoy, where a major WWTP (Design PE of 20,000) and several industrial discharges are located. The Fermoy plant was most recently upgraded in 2006 and features Tertiary treatment. It is predominantly compliant with the UWWT Regulations (the Blackwater is classed as a 'Sensitive River' at this location. No increases in BOD, Ammonia or Orthophosphate result from the current effluent discharge at Fermoy. 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 WWTP. Good ecological status in the Blackwater is restored by the time the river reaches Coleman's Wood, 2km downstream of the Careysville Stream confluence. The minimal nutrient levels entering the Blackwater from the Clondulane plant via the Careysville Stream is not considered to be acting in cumulative manner with the Fermoy discharge.</p> <p>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 several stretches of the Blackwater and its tributaries in recent years.</p>
<p>Describe any likely changes to the site arising as a result of: Reduction of habitat area;</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>Disturbance of key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value; Climate change.</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 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 from 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 Careysville, 500m downstream of where the Careysville Stream enters the Blackwater. The Colndulane plant is small in scale and the minor receiving water shows no mean measurable increase in nutrient loading. As such, the plant is not considered to be contributing to notable nutrient input to the Blackwater and cannot be considered to be negatively affecting the Pearl Mussel population therein.</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 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.</p> <p>The Clondulane plant is currently underloaded and generating a good quality effluent with no measurable increase in nutrient concentrations in the low order Careysville Stream. An increase in Q-rating has been recorded from Moderate results in 2006 to Good in 2009. 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>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 Clondulane WWTP is a modern installation and is generating a good quality effluent; no mean measurable increase in nutrient levels in the Careysville have been recorded during Cork Co Co sampling. Ecological conditions downstream of the Careysville Stream confluence have improved in the Blackwater River in recent years, which is likely to be indicative of a reduction in localised nutrient input; the 2006 upgrade of the Clondulane plant may have contributed slightly to this improvement.</p> <p>Negative cumulative pressures on the Careysville Stream are considered to be negligible. The Clondulane plant is also not predicted to be acting in combination with the Fermoy Blackwater discharge.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Clondulane discharge are envisaged and therefore no further assessment is required.</p>

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Appendix 12 – Conna Screening

EPA Ref: D0439-01

Project	
Location	Discharge associated with agglomeration of Conna village, County Cork.
Distance from designated site	0km: WWTP discharges to the River Bride, inside the cSAC boundary.
Brief description	<p>Conna is situated 14km East of Rathcormac on the R628. The village is well developed from the point of public services such as a primary school, shops and amenities.</p> <p>The waste water from the Conna agglomeration is currently treated by a package treatment plant prior to being discharged to the River Bride. Conna wastewater treatment plant (WWTP) was constructed in 2001. The compound is located adjacent to the River Bride.</p> <p>The main elements of the WWTP are;</p> <ol style="list-style-type: none"> 1. Preliminary Treatment: Automatic Screen 2. Secondary treatment: Biofilm process, 'all in one' treatment plant. 3. Discharge to River Bride <p>The wastewater in Conna is collected in a partially combined foul and sewer drainage network and gravitates to the wastewater treatment plant.</p> <p>The pollution load from the Conna agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & creches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. There are no industrial waste streams discharging into the sewerage network. The main source of emissions from the works is via a 200mm open pipe outfall to the River Bride. The River Bride flows along the Northern boundary of the Compound.</p> <p>The plant is currently underloaded and generates a good quality effluent.</p> <p>In 2011, a new inlet sump was added to the plant.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening

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.

The Conna agglomeration receives secondary treatment at the WWTP, before discharging to the River Bride. The effluent then disperses in the water column.

An observation of the River Bride downstream of the discharge revealed that at this location, the river is wide in scale (10-12m wide) with moderate flows over occasional riffles along a shallow incline. Frequent patches of aquatic macrophytes were observed, including Water crowfoot; no algal mats were observed. Water quality appeared in good condition.

The most recent EPA water quality sampling data from 2009 indicates that the River Bride displays good (Q=4) ecological conditions upstream and downstream of the discharge point (Conna and Tallow bridges respectively).

The overall ecological status of the River Bride is listed by the EPA as improved with good ecological conditions at all stations sampled in 2009. Other improvements relate to slightly polluted conditions near Shanbally in 2003; farmyard slurry was reaching a nearby stream at the time of the survey. Water quality is also likely to have improved downstream of Bridebridge, following upgrades to the Bridebridge and Castlelyons WWTPs.

Sampling data provided by Cork County Council in the licence application indicated the following levels in mg/l:

- BOD = 2
- SS = 48
- COD = 13
- P = 0.09
- N = 3

These are excellent values and are considered low for the scale of the agglomeration; this reflects the present underloaded status of the WWTP. The River Bride is predicted to have a large assimilative capacity at this location. A 0.04 mg/l increase in Orthophosphate was however recorded in the downstream water samples, resulting in a 'Moderate' WFD status for this variable. This is likely to be as a result of the lack of tertiary treatment at the plant.

Mean sampling results from 2006 to 2009 indicate that BOD loading is frequently above the compliance threshold for this variable; however, BOD concentrations in the receiving water still maintain high status throughout this period. Periodic water column deoxygenation around the outfall may be an issue.

Under consultation, Inland Fisheries Ireland made no reference to the Conna WWTP as having a negative influence on fisheries in the catchment.

The Water Framework Directive assigns 'Moderate' status to this stretch of the River Bride; this is based on historical results for aquatic macroinvertebrate diversity found in this area, which have only recently improved. The Conna WWTP is listed as a pressure/risk in the River Bride WMU, owing to "Occasional non-compliant effluent where sufficient capacity exists". This refers to the occasional BOD overloading noted above.

	<p>Upgrades to the Bridebridge, Castlelyons and Rathcormack WWTPs upstream contribute to the reduction of nutrients entering the Bride catchment higher up in the catchment.</p> <p>The Tallow agglomeration in Co. Waterford, some 10km downstream of Conna is treated via two separate systems, one septic tank discharging directly to the Bride and one discharging to a constructed wetland. A flora and fauna survey was carried out in the area in 2005 in order to determine the potential impacts of the existing discharge on the environment as part of plans to upgrade the treatment process. A macroinvertebrate assessment of the River Bride was undertaken as part of the study. The River Bride was sampled upstream and downstream of the present and proposed point of effluent discharge to the river. The study indicated that the river is being marginally impacted by the discharges from the septic tank and reed bed as evident by a drop in water quality from Q4 to Q3-4 between the upstream and downstream sites that were monitored. A new WWTP is scheduled to be constructed in 2012 under a DBO contract. This will further reduce the cumulative wastewater pressures on the River Bride.</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>The underloaded Conna plant is generating an effluent with negligible nutrient input. Eutrophication is not considered to be a major risk.</p> <p>The mean non-compliant status of BOD concentration of the effluent is related to a low number of major overloading events which can be dealt with in the future through increased caretaker observation of the plant. Localised deoxygenation of the River immediately downstream of the outfall after such events is considered to be very limited in geographical extent; the Bride displays rapid biological recovery from such loading.</p> <p>The Conna WWTP lies downstream of the Rathcormack, Bridebridge and Castlelyons WWTPs. These have all been recently upgraded, are underloaded and generating high quality effluent. The cumulative influence of the upgrade of these plants in recent years is considered a significant positive impact on the Bride catchment. The Tallow plant which is currently a negative cumulative pressure downstream of Conna is to be</p>

	<p>upgraded by Waterford Co Co in the next year.</p> <p>The Conna Regional Water Supply abstraction occurs between Bridebridge and Conna. However, it is 10km upstream of the Conna discharge and any changes in assimilative capacity due to abstraction volumes are negated by numerous rivers entering the River Bride between these locations, such as the Glenkeen and Douglas Rivers.</p> <p>The surrounding land use is primarily agricultural pasture. 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. Reduction in slurry usage in the Bride catchment appears to have contributed to an improvement in water quality in recent years.</p> <p>The River Bride was closed to salmon and sea trout fishing in 2010, but is to be re-opened on a catch-release basis in 2011. Inland Fisheries Ireland therefore consider the Bride population to be improved from previous years, but not yet in harvestable surplus. The upgrade of the WWTPs along the Bride is likely to contribute to a recovery in salmon numbers in coming years.</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; Climate change.</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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. • White-clawed Crayfish – Historically not recorded from the Bride catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Atlantic salmon 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</p>

	<p>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. The River Bride has seen significant improvement in water quality in recent years and such deoxygenation is not considered a risk; observed aquatic macrophytes are likely to reduce in number in the coming years as historical enrichment of the riverbed is consumed.</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. A significant degree of floating river vegetation was observed in the River Bride at both Conna Bridge. No gross eutrophication in the form of algal mats was observed. The presence of the current levels of vegetation may be attributed to historical phosphorus and nitrate input to the River, the effects of which will take several years to dissipate; levels of in-stream vegetation are predicted to fall over the coming years. Between the vegetation, the river substrate was observed to be open and no barriers to fish migration were recorded.</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 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.</p> <p>The Conna plant is currently underloaded and producing an effluent that is generally compliant, bar some infrequent periodic BOD overloading. Negative effects of such instances are considered to be very limited in extent due to rapid biological recovery of the river.</p> <p>An overall improvement in ecological conditions has been observed in the River Bride in recent years, attributable to the upgrade of the respective WWTPs and improved agricultural practices along the river. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and Otter).</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 Conna plant is currently underloaded and sampling of the effluent indicates that it is not contributing to significant nutrient input in the overall Bride River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures. Occasional non-compliant BOD loading in the effluent is very infrequent; a new inlet sump has just been added to the plant's primary treatment phase. This addition is considered very likely to deal effectively with occasional spikes in BOD loading on the plant.</p> <p>The upstream Rathcormack, Castlelyons and Bridebridge WWTPs have been recently upgraded and generate good quality effluents; they are not predicted to be acting in conjunction with the Conna WWTP to a significant degree. The Bridebridge WWTP is also to be further upgraded with additional diffusers. The river is currently considered to be in satisfactory ecological condition with good ecological conditions recorded upstream and downstream of the discharge. Inland Fisheries Ireland have no concerns relating to the discharge. Qualifying interests which have the highest ecological sensitivity (Crayfish and Pearl Mussel) are not found in this sub-catchment. Negative pressure on water quality further downstream at Tallow is to be addressed by Waterford Co Co in the near future, thereby further improving water quality in the River Bride.</p> <p>The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAG resulting from the Conna discharge are envisaged and as such no further assessment is required.</p>
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Appendix 13 – Doneraile Screening

EPA Ref: D0300-01

Project	
Location	Discharge associated with agglomeration of Doneraile village, County Cork.
Distance from designated site	0km: WWTP discharges to the Awbeg River, at the cSAC boundary.
Brief description	<p>Doneraile is situated in the Blackwater valley some forty kilometres north of Cork City, eleven kilometres northeast of Mallow and seven kilometres east of Buttevant. The village is located in an area, which is generally referred to as the “Golden vale”, which comprises an extensive area of predominately flat or undulating topography along the Blackwater valley. The census of 1996 indicated a population of 761, while the census of 2002 showed a population of 800.</p> <p>The wastewater in Doneraile is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant. Doneraile WWTP is designed for a Population Equivalent (PE) of 1,680 which was commissioned in early 2009. Activated Sludge is the process employed at the Doneraile waste water treatment plant. Influent initially is pumped from either of the Pumping Stations in operation to the inlet works at the plant. The inlet works consists of 2 nr automatic screen followed by a grit trap and grit classifier. From here the influent gravitates to the inlet sump, from which the influent is forwarded to one of the two Sequential Batch Reactors Tanks. The system is designed to allow fill and aeration for a preset time, once the preset time for fill and aeration is complete, the settlement stage commences.</p> <p>Following settlement, the treated effluent is discharged from the balance tank to the outfall works, which consists of an open channel flume and a composite sampler.</p> <p>The pollution load for the Doneraile agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & crèches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. The final effluent is discharged to the Awbeg River, which is adjacent to the wastewater treatment plant site.</p> <p>The WWTP currently serves a PE of 1 663 and is therefore operating at optimum capacity.</p>
Is the plan directly connected with or	No

necessary to the Natura 2000 site management for nature conservation?

Stage 1 - Screening

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.

The Doneraile agglomeration receives tertiary treatment at the new WWTP, before discharging to the Awbeg River. The effluent then disperses in the water column.

An observation of the Awbeg downstream of the WWTP revealed that at this location, the river is quite wide in scale (6-10m wide) with moderate flows over occasional riffles along a shallow incline. Frequent patches of aquatic macrophytes were observed, including Water crowfoot and Fool's watercress; no algal mats were observed. Water quality appeared in good condition.

The most recent EPA water quality sampling data from 2009 indicates that the Awbeg River displays good (Q=4) ecological conditions downstream of the discharge point, at Ballynamona Bridge.

The overall ecological status of the Lower Awbeg catchment is listed by the EPA as satisfactory with good ecological conditions prevailing, apart from at Buttevant which, although improved from recent years, was less than satisfactory due apparently to storm-overflow of sewage discharges. Buttevant has also since been upgraded to a PE to a design PE of 3150, and is significantly underloaded; such issues associated with storm overflows are now considered to be unlikely. IFI have subsequently reported a notable improvement in river substrate conditions since these upgrade works at Buttevant.

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 = 4
- SS = 11
- COD = 75
- P = 0.51
- N = n/s

These are excellent values for a treatment plant on the scale of Doneraile.

The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.

Under consultation, Inland Fisheries Ireland made no reference to the upgraded Doneraile WWTP as having a negative influence on fisheries in the catchment.

The Water Framework Directive assigns 'Poor' status to this sub-catchment of the Awbeg; this is based on results for aquatic macroinvertebrate diversity found in this area, most recently in early 2009. It is predicted that an improvement in overall water quality conditions downstream of Buttevant and Doneraile will have occurred

	<p>since this status was applied, as both these agglomerations have had recent upgrades to their WWTPs, to include tertiary treatment.</p> <p>Freshwater Pearl Mussel are not known from this sub-catchment. However, White-clawed crayfish have been historically observed in the Awbeg River (though EPA surveys during 2009 did not record any such specimens).</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>The surrounding land use is primarily agricultural pasture; the banks of the Awbeg at this location are dominated by mature broadleaf woodland which is likely to buffer against any fertilizer run-off from surrounding pasture.</p> <p>Other WWTP discharges located in the immediate part of the catchment are the Buttevant WWTP upstream and the Castletownroche and Shanballymore WWTPs 6km downstream. No other major industrial discharges occur in this stretch of the Awbeg and the only other major cumulative pressure is considered to come from agriculture.</p> <p>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. It is this programme which is likely to have most significantly accounted for the</p>

	<p>improvement in water quality observed in the upper Awbeg in recent years. This is likely to act in conjunction with the Buttevant and Doneraile WWTP upgrades to further improve water quality in the Awbeg catchment.</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; Climate change.</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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, White-clawed Crayfish, Atlantic salmon 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>Crayfish sensitivity to changes in water quality can result in significant losses following pollution incidents. Eutrophication can lead to luxuriant plant growth, which in turn traps silt and can result in deoxygenation at night, leading to loss of crayfish habitat. No crayfish were encountered in the Awbeg during EPA 2009 surveys, but it is not clear whether this is indicative of a loss of the population, as no species-specific surveying has been carried out.</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, and also reduce the recruitment success of White-clawed crayfish.</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</p>	<p>The greater Blackwater catchment is under threat from a variety of</p>

<p>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>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 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.</p> <p>The Doneraile plant is currently operating at optimal efficiency and generating a high quality effluent with low nutrient concentrations. The Awbeg is a large waterbody at this location with good ecological conditions now prevailing along its length. No evidence of gross eutrophication downstream of the plant was observed in the Awbeg during field surveys.</p> <p>An overall improvement in ecological conditions has been observed in the upper Awbeg in recent years, with only poor results from 2006 and 2009 being noted by the EPA in Buttevant and Doneraile. Both these plants have been recently upgraded to tertiary treatment and are no longer expected to be contributing to poor water quality. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and White-clawed crayfish).</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 Doneraile WWTP is a modern installation and is generating an excellent effluent for the scale of the plant. The addition of efficient tertiary treatment means that it is unlikely to be contributing to significant nutrient input to the overall Awbeg River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.</p> <p>In the context of other discharges to the Awbeg in the overall vicinity, the Buttevant WWTP has also been recently upgraded to tertiary treatment and will be contributing to an improvement in water quality in the catchment. The Shanballymore WWTP also produces a generally compliant effluent; an upgrade for this plant is also planned in the near future. It is therefore not considered that the Doneraile WWTP is acting in combination with other pressures to any significant degree.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Doneraile discharge are envisaged and therefore no further assessment is required.</p>

Appendix 14 – Dromahane Screening & Assessment

EPA Ref: D0302-01

Project	
Location	Discharge associated with agglomeration of Dromahane village, County Cork.
Distance from designated site	0km: WWTP discharges to the Clyda River, inside the cSAC boundary.
Brief description	<p>Dromahane is a village located 5km southeast of Mallow town. The village has developed around a crossroads and has experienced substantial construction and population growth in recent years.</p> <p>The wastewater in Dromahane is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from both the village gravitates to the wastewater treatment plant.</p> <p>Dromahane WWTP is designed for a Population Equivalent (PE) of 1,000, which was commissioned in 1998. Activated Sludge is the process employed at the Dromahane waste water treatment plant. Influent initially gravitates into a circular GPR inlet sump, from where the effluent is pumped to a steel circular aeration tank. The effluent then flows into the hopper bottomed settling tank. The solids settle while the supernatant flows over the weir and discharges to the river.</p> <p>The pollution load for the Dromahane agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & crèches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. The final effluent is discharged to the Clyda River, which is adjacent to the wastewater treatment plant site.</p> <p>The plant currently services a PE of 1150 based on hydraulic loading and is therefore overloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening	
Describe the individual elements of the	The Dromahane agglomeration receives secondary treatment at the

<p>plan (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 sites.</p>	<p>WWTP, before discharging to the River Clyda. The effluent then disperses in the water column.</p> <p>The River Clyda in the environs of Dromahane is moderate in scale (6-8m wide), with moderate to fast flows.</p> <p>EPA sampling of the Clyda at Clyda Bridge, 1.5km downstream of the WWTP indicates good overall ecological quality (Q=4). This reflects a slight improvement since 2000.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following mean effluent levels from 2007-09 in mg/l:</p> <ul style="list-style-type: none"> • BOD = 7.8 • SS = 16.2 • COD = 40.82 • P = 3.7 • N = 7.8 <p>These are overall compliant for the UWWT thresholds. However, the total phosphate content of 3.7mg/l is of note in relation to the proximity of the Dromahane plant to Pearl Mussel populations in the main Blackwater channel. Mean orthophosphate levels in the Clyda downstream of the plant from 2008/09 were 0.048mg/l (WFD High Status), though one sample was 0.13mg/l.</p> <p>The Dromahane plant is listed in the Blackwater WMU as an 'At Risk' point source due to "insufficient existing capacity, no evidence of impact, discharge to a protected area".</p> <p>The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.</p> <p>Under consultation, Inland Fisheries Ireland made specific reference to the Dromahane WWTP insofar that it is currently operating beyond its design capacity.</p> <p>The Dromahane WWTP is referenced by the Freshwater Pearl Mussel Sub-basin plan as being "located near to the mussel population. The load is above the plant capacity, requires investigation and upgrade with the overall aim of reducing overall sediment, organic and nutrient load".</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> <p>Size and scale;</p> <p>Land-take;</p> <p>Distance from Natura 2000 site or key features of the site;</p> <p>Resource requirements;</p> <p>Emissions;</p> <p>Excavation requirements;</p> <p>Transportation requirements;</p> <p>Duration of construction, operation</p>	<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</p>

<p>etc.;</p> <p>Others.</p>	<p>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>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.</p> <p>The plant lies in the same sub-catchment (Clyda) as the Bweeng WWTP. The Bweeng plant generates a high quality effluent and is over 12km upstream. The two plants are not expected to act in combination in a negative manner.</p> <p>The Clda confluence lies just upstream of Mallow Town. This is highly urbanised area with a number of industrial discharges and a large scale WWTP which has been specifically referenced by Inland Fisheries Ireland as causing periodic pollution of the Blackwater. Lombardstown, Cecilstown and Ballyclough WWTPs also contribute nutrients to the immediate watershed upstream of Mallow.</p>
<p>Describe any likely changes to the site arising as a result of:</p> <p>Reduction of habitat area;</p> <p>Disturbance of key species;</p> <p>Habitat or species fragmentation;</p> <p>Reduction in species density;</p> <p>Changes in key indicators of conservation value;</p> <p>Climate change.</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 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 – Not found in upland peaty and acidic rivers such as the Clyda River/Cummeen Stream <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult</p>

	<p>specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. There are pearl mussel populations in the main Blackwater channel downstream of the Clyda River confluence, in the environs of Mallow town. The Dromahane plant is overloaded beyond its design capacity, and levels of orthophosphate downstream of the plant have been recorded periodically elevated. While the Clyda River is likely to have a high assimilative capacity, shows good macroinvertebrate diversity and little evidence of eutrophication, it may be transmitting phosphate from the Dromahane plant to the Blackwater where impacts to Pearl Mussel populations are possible.</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. As stated, there is little evidence of such impacts in the Clyda River, and no impacts to migrating salmon are envisaged.</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 species which have also been recorded in the overall Blackwater catchment. Some macrophytes were observed in the Clyda River but these were not considered to be a result of significant river eutrophication.</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 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.</p> <p>The Clyda River is overall in satisfactory condition, reflecting the relatively low level of negative pressures along its length. However, the overloaded Dromahane plant is located only 2km upstream of the Pearl Mussel population in the Blackwater River. The lack of nutrient removal via tertiary treatment at the Dromahane WWTP is noted as potentially contributing to reproductive failure in these populations.</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>While the Dromahane discharge is still generally compliant, the fact that the plant is overloaded and potentially contributing elevated levels of inorganic nutrients in close proximity to Pearl Mussel populations, is a key factor to be considered.</p> <p>Numerous other pressures occur in the environs of Mallow which combine to apply negative pressure to the mussel and fish populations in this stretch of the Blackwater.</p> <p>Given the fact that the Dromahane WWTP is currently overloaded and in need of upgrade and nutrient removal, combined with the fact that several Pearl Mussel populations are found in close proximity to the Blackwater-Clyda confluence, the screening exercise concludes that further assessment should be carried out in Stage 2 below.</p> <p>This assessment considers the potential impacts of the discharge with specific reference to the species and/or habitats which may be impacted.</p>
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<h3>Stage 2 - Project Assessment</h3>	
<p>Describe the elements of the plan that are likely to give rise to significant effects on the site</p>	<p>Waste water treatment plants can contribute significant nutrient and organic loads to rivers. There is potential that the discharge from the Dromahane WWTP is, in combination with other activities within Blackwater River catchment, leading to increased levels of nutrients in the main channel of the Blackwater. This may lead to ongoing eutrophication of the river.</p>
<p>Set out the conservation objectives of the site</p>	<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> (Alno-Padion, Alnion incanae, Salicion albae) (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); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330); Mediterranean salt meadows (<i>Juncetalia maritimi</i>)

	<p>(1410); Perennial vegetation of stony banks (1220); Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles (91A0).</p> <p>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>); Twaite 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>)</p> <p>3. To maintain the extent, species richness and biodiversity of the entire site.</p> <p>4. To establish effective liaison and co-operation with landowners, legal 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>Describe how the project will affect key species and key habitats</p>	<p>Of key concern in relation to the Dromahane WWTP is potential negative impact to the Freshwater Pearl Mussel, which acts as a keystone species for the SAC. This species requires stable cobble and gravel substrate with very little fine material below pea-sized gravel. Adult mussels are two-thirds buried and juveniles up to five to ten years old are totally buried within the substrate. The lack of fine material in the river bed allows for free water exchange between the open river and the water within the substrate. The free exchange of water means that oxygen levels within the substrate do not fall below those of the open water. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels. The clean substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. Organic particles within the substrate can exacerbate the problem by consuming oxygen during the process of decomposition. The habitat must be free of filamentous algal growth and rooted macrophyte growth. Both block the free exchange of water between the river and the substrate and may also cause night time drops in oxygen at the water-sediment interface. The open water must be of high quality with very low nutrient concentrations, in order to limit algal and macrophyte growth. Nutrient levels must be close to the reference levels for the river they inhabit. Phosphorus must never reach values that could allow for sustained, excessive filamentous algal growth. The presence of sufficient salmonid fish to carry the larval glochidial stage of the pearl mussel life cycle is essential.</p> <p>A number of surveys have identified numerous pearl mussel colonies in the environs of Mallow Town, immediately downstream of the Clyda River's confluence with the Blackwater. Reproductive success in this population is negligible, owing to historic pollution of the river and ongoing elevated inorganic nutrient levels in the water column.</p> <p>The Dromahane WWTP produces a generally good quality effluent that is unlikely to affect any of the qualifying interests through direct deoxygenation of the river or accumulation of sediment. However, the plant is currently overloaded and does not feature nitrogen/phosphate removal as part of its treatment process. Cumulative influences such as the nutrient content contributed by the Mallow WWTP on the Blackwater and Ballyclough/Cecilstown WWTPs on the Ballyclough Stream may exacerbate these negative effects.</p> <p>In relation to the other qualifying species of the Blackwater cSAC,</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. Such changes are likely to affect stocks of salmon within the river, a qualifying species that is already under pressure in the catchment. Lamprey, which also require high water quality with low levels of sediment are also likely to be similarly affected.</p> <p>Reduction or changes in overall fish stocks will have subsequent effects on predators, most notably otter, for which the site is also designated.</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>Elevated levels of suspended solids from effluent discharges pose a risk to salmon and lamprey recruitment where settlement on spawning gravels and/or redds may occur.</p> <p>As the Dromahane discharge is compliant for oxygen loading and suspended solids, these negative effects are not considered likely. The Clyda river displays good ecological status for the majority of its length and is likely to have a high assimilative capacity for nutrients. However, it is the proximity of the Dromahane WWTP to Pearl Mussel populations in the Blackwater River that is a key concern.</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>The key ecological relationships that define the structure and function of the Blackwater River as part of the cSAC as a whole are likely to be impacted by potential nutrient enrichment. However, given the minor scale of the discharge, systemic disturbance is not envisaged.</p> <p>The critical matter relating to the Dromahane discharge concerns the threat posed to remnant Freshwater Pearl Mussel populations found in the Blackwater downstream of the Clyda confluence. EPA sampling of the Blackwater itself downstream of this point, in Mallow Town indicates that the river displays Moderate ecological status (Q=3-4). Mallow features a number of industrial discharges and a large scale which exert significant pressure on water quality in this area.</p> <p>The Blackwater remains an open Salmon fishery, indicating Inland Fisheries Ireland's opinion that the species remains in harvestable surplus for the catchment. The assimilative capacity of the Blackwater for nutrients is high overall, but localised deoxygenation of the water column or clogging of the waterbody with macroalgae and macrophytes may be considered a significant impact to migrating and spawning salmon. Lampreys are known to require equitable water quality standards to salmon. These species are unlikely to be affected by the Dromahane discharge, as sampling indicates that Q ratings are good downstream of the plant. However, this is not indicative of the negative influence on Pearl Mussels caused by even small increases in Orthophosphate..</p> <p>Reduction in key diet species such as salmonids may negatively affect otter populations in the catchment. Competition with the invasive non-native mink may act in combination in this regard. Again, such impacts downstream of the Dromahane discharge are considered unlikely; despite being overloaded, the effluent is overall compliant with UWWT regulations..</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>Overall, the Dromhane WWTP generates UWWT compliant effluent, despite being currently overloaded. However, only secondary treatment is currently applied. There are no plans in place to upgrade the plant to tertiary treatment.</p> <p>The Freshwater Pearl Mussel Sub-basin Plan makes specific reference to investigating the need for upgrade due to overloading and installing nutrient removal at the plant, owing to the proximal downstream presence of pearl mussels.</p>
<p>Conclusion</p>	<p>In conclusion, the negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Clyda River confluence due to overloading and ongoing phosphorus input to the lower stretch of the river is considered a significant impact that will continue until nutrient removal is put in place at the plant. This is in contravention of Conservation Objective Number 2 for the cSAC. Significant cumulative pressure on Pearl Mussel populations in the environs of Mallow Town results from industrial discharges and WWTP input from Mallow and other smaller plants within a 10km radius, such as Ballyclough, Cecilstown and Lombardstown.</p> <p>The assessment therefore concludes that impacts to the Freshwater Pearl Mussel, a qualifying interest for the Blackwater River (Cork/Waterford) cSAC, cannot be discounted at this stage, due to potential significant cumulative negative pressure from the overloaded secondary treatment-only Dromahane plant when placed in the context of other major localised pressures around Mallow Town.</p>

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Appendix 15 – Fermoy Screening & Assessment

EPA 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 WWTW 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 Town and environs now has a population in excess of 5,800. (Census,</p>

	<p>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>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 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.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application from 2009 indicates the following effluent levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = 1.73 • SS = 4 • COD = <21 • P = 1.5 • N = 5.1
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	<p>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.</p> <p>The main channel of the Blackwater is designated as a Salmonid River in the European Communities (Quality of Salmonid Waters) Regulations, 1988. Downstream sampling indicates that the Fermoy WWTW is compliant with these regulations.</p> <p>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 plan 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.</p> <p>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 WWTW 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 WWTW; 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.</p> <p>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.</p> <p>The Fermoy WWTW is also not listed as a WWTW risk to the overall Blackwater WMU.</p> <p>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.</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</p>	<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>2000 site by virtue of: 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>	<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. This discharge results from the treatment process at this facility and does not contain any wastewater as defined by the UWWT regulations. The main activity at the 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.</p> <p>Sanitary effluent arising at the installation discharges to the Fermoy Town Council sewerage system and treatment plant. 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 Wastewater Treatment Plant, 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.</p> <p>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. While the EPA inspector's report for this IPPC discharge does not consider it to be significant, it may be acting cumulatively with other pressures upstream of the Fermoy WWTP to cause the observed reduction macroinvertebrate density at Fermoy Bridge. 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 this discharge.</p>
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This may also be contributing to poor macroinvertebrate diversity at this location.

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 evidence based upon valid studies of serious and irreversible damage, but some degree of scientific doubt, it may be important to consider

	<p><i>implementing interim precautionary measures or risk management actions that may avert harm, while ongoing research fills the knowledge gap".</i> 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, Camlin, 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, Fermoy 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 Brandon 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; Climate change.</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 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

	<p>stretches of catchment</p> <ul style="list-style-type: none"> • 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 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.</p> <p>The Fermoy plant is currently significantly underloaded and generating a good quality effluent with low nutrient concentrations. Only Good</p>

	<p>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>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.</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 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

<p>Describe the elements of the plan that are likely to give rise to significant effects on the site</p>	<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>
<p>Set out the conservation objectives of the site</p>	<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</p>

	<p>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> (Alno-Padion, Alnion incanae, Salicion albae) (91E0); <i>Taxus baccata</i> woods of the British Isles (91J0); Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (3260); Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330); Mediterranean salt meadows (<i>Juncetali 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>); Twaite 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 element, species richness and biodiversity of the entire site. 4. To establish effective liaison and co-operation with landowners, legal users and relevant authorities. <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 WWTP 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</p>

	<p>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</p>

	<p>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 discharge are not considered to be a significant risk to the cSAC/SPA.</p>

Appendix 16 – Glanworth Screening

EPA Ref: D0445-01

Project	
Location	Discharge associated with agglomeration of Glanworth village, County Cork.
Distance from designated site	8km: WWTP discharges to the Funshion River, a significant distance upstream of the cSAC boundary.
Brief description	<p>Glanworth is situated 10km north-west of Fermoy and 56km north-west of Cork City, in the Blackwater valley. The village is well developed from the point of public services such as a primary school, shops and amenities. The waste water from the Glanworth agglomeration is currently treated by a package treatment plant prior to being discharged to the River Funshion. Glanworth wastewater treatment plant (WWTP) was constructed in 2001. The compound is located adjacent to the River Funshion and the Glanworth Bridge.</p> <p>The main elements of the WWTP are;</p> <ol style="list-style-type: none"> 1. Preliminary Treatment: Grit Trap and Automatic Screen 2. Secondary treatment: Biofilm process, 'all in one' treatment plant. 3. Discharge to River Funshion <p>The wastewater in Glanworth is collected in a partially combined foul and sewer drainage network and gravitates to the wastewater treatment plant.</p> <p>The pollution load from the Glanworth agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & creches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. There are no industrial waste streams discharging into the sewerage network. The main source of emissions from the works is via a 300mm open pipe outfall to the River Funshion.</p> <p>The plant has a design PE of 800 and currently services an agglomeration with a PE of 607. It is therefore underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening

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.

The Glanworth agglomeration receives tertiary treatment at the WWTP, before discharging to the Funshion River. The effluent then disperses in the water column.

An observation of the Funshion downstream of the WWTP revealed that at this location, the river is quite wide in scale (>8m wide upstream, >12m wide downstream) with moderate flows over occasional riffles along a shallow incline. Frequent patches of aquatic macrophytes were observed, including Water crowfoot and Fool's watercress; no algal mats were observed. Water quality appeared in good condition.

The most recent EPA water quality sampling data from 2009 indicates that the Funshion River displays high (Q=4-5) ecological conditions downstream of the discharge point, at Ballynahow Bridge.

The overall ecological status of the Funshion catchment is listed by the EPA as satisfactory and improved since the 2006 survey, with good and high ecological conditions now prevailing. The only major source of pollution now exists via the Gradoge River north of Mitchelstown; this river has a long history of pollution from the industrial and municipal discharges in the down, and has improved slightly in recent years. Downstream of the Gradoge confluence, the Funshion still maintains Good ecological quality (Q=4). Full biological recovery of the Funshion has occurred by the time the river reaches Glenavuddig Bridge near Kildorrery. A slight reduction is observed in Glanworth, upstream of the WWTP; again, high conditions are recorded by the time river reaches the next bridge at Ballynahow, some 3km downstream.

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 = 36
- SS = 217
- COD = 103
- P = 3.4
- N = 29.9

These are generally non-compliant values under the UWWT regulations. More recent sampling from August 2010 reveals very similar figures.

Despite this, mean figure from 2008/09 indicates that downstream river samples from the Funshion are on average, of Good or High WFD status for BOD, Ammonia and Orthophosphate. This indicates that the Funshion has a generally high assimilative capacity for nutrients and oxygen loading. This is conformed by the High ecological status recored by EPA sampling 3km downstream of Glanworth at Ballynahow.

The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.

Under consultation, Inland Fisheries Ireland made no reference to the Glanworth WWTP as having a negative influence on fisheries in the catchment.

The Water Framework Directive assigns 'Moderate' status to this stretch of the Funshion; this is based on historical records for Freshwater Pearl

	<p>Mussel in the catchment. However, it is now considered that this sub-population is now extinct, as no live specimens have been found despite several surveys of the Funshion.</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>The surrounding land use is primarily rich agricultural pasture; some riparian tree-lines were observed during surveys which are likely to buffer against any fertilizer run-off from surrounding farmland.</p> <p>Other WWTP discharges located in the immediate part of the catchment are the Kildorrery WWTP (10km upstream) and the Mitchelstown WWTP (a further 12km upstream of Kildorrery). The latter was refurbished in 1998 to include Tertiary treatment and currently is underloaded. This level of treatment is likely to be partly responsible for the ongoing improvement in water quality in the Gradoge and Upper Funshion Rivers.</p> <p>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 is also likely to have accounted for some of the improvement in water quality observed in the Funshion in recent years. As a result, the Funshion displays high assimilative capacity at Glanworth and no impacts resulting from the non-compliant discharge have been recorded.</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; Climate change.</p>	<p>There will be no loss of or reduction in Annex I habitats as a result of the operation of the existing WWTP. The Funshion River is not contained within the cSAC boundary, but a number of qualifying species may still be found within the sub-catchment.</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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. • White-clawed Crayfish – Not known from the Funshion River <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Atlantic salmon 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. 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. Levels of algae and macrophytes in the Funshion were moderate, this being related to historical nutrient input to the river. Current improved levels of water treatment at the other WWTPs in the catchment and reduced use of fertilizer in the coming years will lead to a reduction in instream vegetation. This is a positive trend.</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 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.</p> <p>The Glanworth plant is a relatively modern plant and is currently underloaded; one would expect sampling to display a better quality of effluent. However, the Funshion is a relatively large waterbody with high assimilative capacity at this location with good ecological conditions now prevailing along its length. No evidence of gross eutrophication downstream of the plant was observed in the Funshion during field surveys.</p> <p>An overall improvement in ecological conditions has been observed in the Funshion in recent years, this being related in part to improvements in waste water treatment in the catchment; this is likely to continue over the next several years and is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey).</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 Glanworth WWTP is currently not generating a compliant effluent. However, the receiving water does not appear to be being impacted by this discharge, which occurs a large distance upstream of the cSAC boundary. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures. Excellent river conditions prevail in the Funshion just upstream of the Blackwater confluence and no negative impacts are predicted to be transferred to the latter waterbody.</p> <p>In the context of other discharges to the Funshion in the overall vicinity, the Kildorrery WWTP is similar in scale and occurs 10km upstream; this generates an excellent quality effluent with negligible effects on water quality. This may in fact be negating against any negative impacts of the Glanworth discharge by maximising the assimilative capacity of the Funshion.</p> <p>The Funshion displays High ecological status at Kilworth, just upstream of the Blackwater confluence. Such elevated water quality entering the Blackwater will contribute to maintaining good ecological conditions in the main channel.</p> <p>The screening exercise concludes that despite producing a non-compliant effluent, the assimilative capacity of the Funshion negates any deleterious impacts. As such, no significant impacts to the Blackwater River cSAC resulting from the Glanworth discharge are envisaged and therefore no further assessment is required.</p>

Appendix 17 – Kanturk Screening & Assessment

EPA Ref: D0203-01

Project	
Location	Discharge associated with agglomeration of Kanturk town, County Cork.
Distance from designated site	0km: WWTP discharges to the Allow River, inside the cSAC boundary.
Brief description	<p>Kanturk is located approximately 13 miles North West of Mallow, in the Blackwater Valley and functions as a key support settlement. The Local Area Plan strategy aims to improve its status as an important local centre by establishing links with Millstreet and Newmarket to form a strategic growth and development focus for North West Cork.</p> <p>Kanturk Wastewater Treatment Works was constructed on a green field site close to the townland of Greenard, south of Kanturk town. The site is approximately 1.56 hectares in area. The plant was opened in 1994.</p> <p>From the inlet flume, the wastewater is pumped through screw pumps to a splitter chamber where, the flow is divided evenly between two oxidation ditches. The design of the treatment plant is such that two separate process streams are provided. This ensures that each stream can be operated in isolation, allowing the continuous treatment of wastewater while also enabling maintenance and repair work of the plant to be carried out.</p> <p>The most recent upgrades that were made to the plant were in 2007. A 5mm screening unit was put in place at the pumping station replacing comminutors, which were not achieving the required results.</p> <p>The treatment plant was designed to cater for a population equivalent of 3500. In the 2006 census, the population of Kanturk was quoted as 1,915. The total PE of the Kanturk agglomeration is currently estimated at 2534. The plant is therefore significantly underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening	
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>The Kanturk agglomeration receives secondary treatment at the WWTP, before discharging to the River Allow. The effluent then disperses in the water column.</p> <p>An observation of the River Allow downstream of the WWTP revealed that at this location, the river is relatively large in scale (>10m wide) with moderate flows and frequent riffles along a shallow incline. As such, it is</p>

expected to have a large assimilative capacity for oxygen loading.

The most recent EPA water quality sampling data from 2009 indicates that the River Allow displays good (Q=4) ecological conditions downstream of the discharge point, 1.3km downstream of Kanturk Bridge. This is a slight improvement on conditions recorded over several years up to 2006, where Q ratings were listed as Q=3-4. This improvement may be related to the minor 2007 upgrade to the plant and repairs to the sewer collection network in the urban parts of the town.

The overall ecological status of the catchment is listed by the EPA as satisfactory, with only High and Good ecological quality recorded, including downstream of the urban environs of Kanturk.

Sampling data for the discharge provided by Cork County Council with the Licence Application indicates that the plant is generating a good quality effluent:

- BOD = 2.32
- SS = 3
- COD = <21
- P = 1.316
- N = 14.18

Cork Co Co upstream and downstream sampling of the River Allow at the time of the above effluent sampling indicated that no measureable increase in the levels of BOD, Ammonia or Orthophosphate occurred as a result of the discharge. The River Allow was afforded High WFD status at this location for all three of the above variables at this location.

However, IFI reported under consultation that some evidence of gross organic matter occurs in the Allow downstream of the Kanturk discharge and recommends that the requirement for nutrient removal may need to be revised. This effect is apparently being compounded by the Kanturk Creamery discharge, where enrichment and grey water have been recorded.

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 Kanturk. As such, the WWTP is not contributing to decline in water quality and is therefore compliant with the regulations.

The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.

The Water Framework Directive assigns 'Moderate' status to the River Allow; this is based on the presence of a non-recruiting population of Freshwater Pearl Mussels 3km upstream at Coolageelagh, and further upstream at John's Bridge in the townland of Ballybahallagh. Further populations occur in the main Blackwater channel at the River Allow confluence.

The Second Draft Freshwater Pearl Mussel Sub-Basin Plan lists the Kanturk WWTP as potentially having an adverse effect on the pearl mussel, given that there are records of this species upstream and downstream of the plant. The lack of tertiary treatment at the plant means that there is a risk of elevated inorganic nutrient input to the

	<p>catchment in relatively close proximity to pearl mussel populations.</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: 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>	<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>Other WWTPs in the Allow sub-catchment are located at Freemount, Newmarket, Meelin and Boherbue. These are geographically well separated from Kanturk and are not expected to be acting cumulatively with the Kanturk discharge to any major degree. Concentrated local pressures in the environs of Kanturk present a more significant threat to localised water quality; North Cork Co-op Creameries and Kanturk Mart are both located in the immediate vicinity of the town. The mart may lead to shock loading of the WWTP, while the sewage discharge of creamery, which is licensed by Cork Co Co, is reported to be causing filamentous green algae growth and a grey water discharge has been noted. These may act in conjunction to reduce water quality in the environs of Kanturk. The current Q=4 rating is indicative of the River Allow's high assimilative capacity for oxygen loading. However, nutrient input may have eutrophying effects further downstream.</p> <p>The Banteer WWTP also discharges to the Blackwater, 1km downstream of the River Allow confluence. This is a secondary treatment plant; however, sampling indicates that it generates a high quality effluent with low nutrient concentrations. No measurable changes in water quality were recorded at the time of sampling.</p> <p>Ducon Concrete is also located on the River Allow downstream of the Kanturk WWTP. This is a processing plant which produces building materials. No quarrying occurs at this location, but an industrial discharge occurs from the plant and flows to the River Allow. Cork County Council has reported that during wet weather, fine sediment is washed from the facility via surface water drains which enter the River Allow. Current sediment traps do not catch the very fine silt which results from this run off. This may act in conjunction with the Kanturk WWTP. However, it is considered that the risk of such siltation effects has diminished significantly from the Irish construction peak in 2007.</p> <p>There has been very significant change in agricultural infrastructure and practices in recent years which should have the effect of dramatically</p>

	<p>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.</p> <p>The IRD Duhallow LIFE project entitled 'Restoration of the Upper River Blackwater SAC for the Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>), Atlantic Salmon (<i>Salmo salar</i>), European Otter (<i>Lutra lutra</i>) and Kingfisher (<i>Alcedo atthis</i>)' aims to improve habitat quality in the Allow catchment. This is likely to have a beneficial effect via reducing land-based pressures on the river, and may help negate some of the enrichment pressures described above. A key deliverable is the promotion of cattle fencing along the river to prevent further siltation and pollution of the river. An improvement in such habitat quality should further increase the assimilative capacity of the Allow and thus act against any negative pressures further downstream.</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; Climate change.</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 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 – Not found in upland peaty and acidic rivers such as the Clyda River/Cummeen Stream <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. There are a number pearl mussel populations in the main Blackwater channel closely downstream of the Allow River confluence. Some gross enrichment of the river has been noted downstream of Kanturk, though Q ratings are good. While the Allow River is likely to have a high assimilative capacity, and showed good macroinvertebrate diversity during 2009 EPA sampling, it may be transmitting phosphate from the Kanturk plant to the Blackwater where impacts to Pearl Mussel populations are possible.</p> <p>Accelerated algae and plant growth within river water columns leads to</p>

	<p>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. As stated, there is little evidence of such impacts in the Allow River, and no impacts to migrating salmon are envisaged.</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 species which have also been recorded in the overall Blackwater catchment. Some macrophytes were observed in the Allow River, though not in densities high enough to lead to major disruption of these species.</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 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.</p> <p>The River Allow is listed by the EPA as overall in satisfactory condition, However, Kanturk is located only 3km upstream of a Pearl Mussel population in the Blackwater River, and is the location of a concentrated number of point source pressures. The lack of nutrient removal via tertiary treatment at the Kanturk WWTP may be resulting in elevated levels of inorganic nutrients entering the Allow and being transmitted downstream to 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>While the Kanturk discharge is UWWT compliant, the proximity of the (secondary treatment only) plant to Pearl Mussels in the Blackwater, is a key factor to be considered.</p> <p>Several other pressures occur in the environs of Kanturk which potentially combine to apply negative pressure. The North Cork Co-op Creamery and Ducon Concrete are of particular note in this regard.</p> <p>Given the fact that IFI under consultation raised the issue of noted enrichment downstream of Kanturk, combined with the fact that several Pearl Mussel populations are found in close proximity to the Blackwater-</p>

	<p>Allow confluence, the screening exercise concludes that further assessment should be carried out in Stage 2 below.</p> <p>This assessment considers the potential impacts of the discharge with specific reference to the species and/or habitats which may be impacted.</p>
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Stage 2 - Project Assessment

<p>Describe the elements of the plan that are likely to give rise to significant effects on the site</p>	<p>Waste water treatment plants can contribute significant nutrient and organic loads to rivers. There is potential that the discharge from the Kanturk WWTP is, in combination with other activities within the Allow River sub-catchment, leading to increased levels of nutrients in the main channel of the Blackwater.</p>
<p>Set out the conservation objectives of the site</p>	<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> (Alno-Padion, Alnion incanae, Salicion albae) (91E0); <i>Taxus baccata</i> woods of the British Isles (91J0); Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation (3260); Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (1330); Mediterranean salt meadows (<i>Juncetali 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>); Twaite 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.

	<p>4. To establish effective liaison and co-operation with landowners, legal 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>Describe how the project will affect key species and key habitats</p>	<p>Of key concern in relation to the Kanturk WWTP is potential negative impact to the Freshwater Pearl Mussel, which acts as a keystone species for the SAC. This species requires stable cobble and gravel substrate with very little fine material below pea-sized gravel. Adult mussels are two-thirds buried and juveniles up to five to ten years old are totally buried within the substrate. The lack of fine material in the river bed allows for free water exchange between the open river and the water within the substrate. The free exchange of water means that oxygen levels within the substrate do not fall below those of the open water. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels. The clean substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. Organic particles within the substrate can exacerbate the problem by consuming oxygen during the process of decomposition. The habitat must be free of filamentous algal growth and rooted macrophyte growth. Both block the free exchange of water between the river and the substrate and may also cause night time drops in oxygen at the water-sediment interface. The open water must be of high quality with very low nutrient concentrations, in order to limit algal and macrophyte growth. Nutrient levels must be close to the reference levels for the river they inhabit. Phosphorus must never reach values that could allow for sustained, excessive filamentous algal growth. The presence of sufficient salmonid fish to carry the larval glochidial stage of the pearl mussel life cycle is essential.</p> <p>A number of surveys have identified numerous pearl mussel colonies in the environs of the Allow-Blackwater confluence, at Ballymaquirk and Dromcummer. Reproductive success in this population is negligible, owing to historic pollution of the river and ongoing elevated inorganic nutrient levels in the water column.</p> <p>The Kanturk WWTP produces a generally good quality effluent that is unlikely to affect any of the qualifying interests through direct deoxygenation of the river or accumulation of sediment. However, the plant does not feature nitrogen/phosphate removal as part of its treatment process. Cumulative influences include the nutrient content contributed by the North Cork Co-op Creamery and Ducon Concrete and increased loading on the Kanturk WWTP during Kanturk Mart days. Very fine silt which enters the Allow from the Ducon site is also a concern.</p> <p>In relation to the other qualifying species of the Blackwater cSAC, 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. Such changes are likely to affect stocks of salmon within the river, a qualifying species that is already under pressure in the catchment. Lamprey, which also require high water quality with low levels of sediment are also likely to be similarly affected.</p> <p>Reduction or changes in overall fish stocks will have subsequent effects on predators, most notably otter, for which the site is also designated.</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>Elevated levels of suspended solids from effluent discharges pose a risk to salmon and lamprey recruitment where settlement on spawning gravels and/or redds may occur.</p> <p>As the Kanturk discharge is compliant for oxygen loading and suspended solids, these negative effects are not considered likely; the Allow has been noted for its high assimilative capacity for oxygen loading. The Allow river displays good ecological status for the majority of its length and some improvement has been seen downstream of Kanturk recently, possibly due to minor upgrade works in 2007. However, it is the proximity of the Kanturk WWTP to Pearl Mussel populations in the Blackwater River that is a key concern.</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>The key ecological relationships that define the structure and function of the Blackwater River as part of the cSAC as a whole are likely to be impacted by potential nutrient enrichment. However, given the minor scale of the discharge, systemic disturbance is not envisaged.</p> <p>The critical matter relating to the Kanturk discharge concerns the threat posed to remnant Freshwater Pearl Mussel populations found in the Blackwater downstream of the Allow confluence. EPA sampling of the Blackwater itself downstream of this point, at Dromcummer indicates that the river displays High ecological status (Q=4-5). This high status is unchanged from upstream of the confluence. Cork Co Co sampling from downstream of the Banteer WWTP discharge on the Blackwater indicate that Orthophosphate concentrations remain below 0.05mg/l at this location.</p> <p>The Blackwater remains an open Salmon fishery, indicating Inland Fisheries Ireland's opinion that the species remains in harvestable surplus for the catchment. The assimilative capacity of the Blackwater for nutrients is high overall, but localised deoxygenation of the water column or clogging of the waterbody with macroalgae and macrophytes may be considered a significant impact to migrating and spawning salmon. Lampreys are known to require equitable water quality standards to salmon. These species are unlikely to be affected by the Kanturk discharge, as sampling indicates that Q ratings are good downstream of the plant.</p> <p>Reduction in key diet species such as salmonids may negatively affect otter populations in the catchment. Competition with the invasive non-native mink may act in combination in this regard. Again, such impacts downstream of the Kanturk discharge are considered unlikely, as the effluent is overall compliant with UWWT regulations.</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>Overall, the Kanturk WWTP generates UWWT compliant effluent, and is underloaded by some degree. However, only secondary treatment is currently applied.</p> <p>The Freshwater Pearl Mussel Sub-basin Plan makes specific reference to investigating the need for upgrade due to overloading and installing nutrient removal at the plant, owing to the proximal downstream presence of pearl mussels.</p> <p>There are currently no plans in place to upgrade the plant to tertiary</p>

	<p>treatment.</p> <p>In relation to the potential negative effect of river sediment arising from run off from the Ducon site, some further mitigation measures are likely to be implemented as part of the licence review for this operation. Cork County Council are currently carrying out this review and any new licence will contain a number of provisions requiring the prevention of sediment-loaded run-off entering the Allow from the Ducon site. This will have a cumulative beneficial effect on river substrate silt levels.</p>
<p>Conclusion</p>	<p>In conclusion, cumulative pressure on the Allow is considered to be quite high in the environs of Kanturk, but EPA sampling indicates good ecological status downstream of the town and Cork Co Co sampling shows no measureable increase in nutrients in the River Allow downstream of the WWTP, Ducon Concrete and the North Cork Co-op Creamery. The main Blackwater channel also displays high ecological status downstream of the Allow and Glen River confluences. Sampling of the river downstream of the Banteer WWTP indicates that the river displays high status for BOD, Ammonia and Orthophosphate. As such, it may appear that the nutrient input from these plants is not leading to negative ecological impacts.</p> <p>Given that high ecological conditions prevail in the Blackwater around the Allow and Glen River confluences, it is reasonable to suggest that the dilution factors and assimilative capacity in the Blackwater at this location are sufficiently high to absorb the slightly elevated inorganic nutrient input potentially entering the system from Kanturk. Pearl Mussel populations in the immediate area are therefore unlikely to be impacted by WWTP output to any major degree along this stretch of the Blackwater. Other pressures, such as the risk of sediment in the river arising downstream of Ducon Concrete are to be addressed by the Cork County Council licensing process.</p> <p>The assessment therefore concludes that potential impacts to the cSAC resulting from the Kanturk discharge are not considered to be significant, given the satisfactory status of the River Allow and the excellent status of the Blackwater downstream of the confluence. Concerns raised by IFI regarding river conditions immediately downstream of the Kanturk discharge are likely to be related to a very localised impact that is not affecting the qualifying interests of the catchment at large.</p> <p>The assessment concludes that the risk of significant impacts to the cSAC from the Kanturk WWTP discharge can be ruled out.</p>

Appendix 18 – Kildorrery Screening

EPA Ref: D0442-01

Project	
Location	Discharge associated with agglomeration of Kildorrery village, County Cork.
Distance from designated site	20km: WWTP discharges to the Funshion River, a significant distance upstream of the cSAC boundary.
Brief description	<p>Kildorrery Village is located on the N73, 11 Km west of Mitchelstown. The village is well developed from the point of public services such as a primary school, shops and amenities. The waste water from the Kildorrery agglomeration is currently treated by a package treatment plant prior to being discharged to the River Funshion.</p> <p>Kildorrery wastewater treatment plant (WWTP) was constructed in 2000 on the site of a pre-existing septic tank which had previously served the village.</p> <p>The main elements of the WWTP are;</p> <ol style="list-style-type: none"> 1. Preliminary Treatment: Grit Trap and Automatic Screen 2. Secondary treatment: Activated Sludge (Aeration Tank and Clarifier) 3. Discharge to River Funshion <p>The wastewater in Kildorrery is collected in a partially combined foul and sewer drainage network and gravitates to the wastewater treatment plant.</p> <p>The pollution load from the Kildorrery agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & creches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. There are no industrial waste streams discharging into the sewerage network. The main source of emissions from the works is via a 225mm open pipe outfall to the River Funshion.</p> <p>The plant has a design PE of 800 and currently services an agglomeration with a PE of 500. It is therefore underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

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 Kildorrery agglomeration receives secondary treatment at the WWTP, before discharging to the Funshion River. The effluent then disperses in the water column.</p> <p>An observation of the Funshion downstream of the WWTP revealed that at this location, the river is quite wide in scale (>8m wide) with moderate flows over occasional riffles along a shallow incline. Frequent patches of aquatic macrophytes were observed, including Water crowfoot and Fool's watercress; no algal mats were observed. Water quality appeared in good condition.</p> <p>The most recent EPA water quality sampling data from 2009 indicates that the Funshion River displays high (Q=4-5) ecological conditions downstream of the discharge point, at Bealaboga Bridge.</p> <p>The overall ecological status of the Funshion catchment is listed by the EPA as satisfactory and improved since the 2006 survey, with good and high ecological conditions now prevailing. The only major source of pollution now exists via the Gradoge River north of Mitchelstown; this river has a long history of pollution from the industrial and municipal discharges in the down, and has improved slightly in recent years. Downstream of the Gradoge confluence, the Funshion still maintains Good ecological quality (Q=4). Full biological recovery of the Funshion has occurred by the time the river reaches Glenavuddig Bridge near Kildorrery.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application from 2009 indicates the following effluent levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = 6 • SS = 1 • COD = 19 • P = 2.81 • N = 38.1 <p>These are excellent values which are compliant with the UWWT regulations. No changes to the BOD, Ammonia and Orthphosphate levels in the river were detected by sampling downstream of the discharge.</p> <p>The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Kildorrery WWTP as having a negative influence on fisheries in the catchment.</p> <p>The Water Framework Directive assigns 'Moderate' status to this stretch of the Funshion; this is based on historical records for Freshwater Pearl Mussel in the catchment. However, it is now considered that this sub-population is now extinct, as no live specimens have been found despite several surveys of the Funshion.</p>
<p>Describe any likely direct, indirect or secondary impacts of the project</p>	<p>All impacts relate to the influence of the contents of the respective effluents entering the receiving waters. No construction, land-take etc.</p>

<p>(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>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>The surrounding land use is primarily rich agricultural pasture; some riparian treelines were observed during surveys which are likely to buffer against any fertilizer run-off from surrounding farmland.</p> <p>Other WWTP discharges located in the immediate part of the catchment are the Glanworth WWTP (10km downstream) and the Mitchelstown WWTP (12km upstream). The latter was refurbished in 1998 to include Tertiary treatment and currently is underloaded. This level of treatment is likely to be partly responsible for the ongoing improvement in water quality in the Gradoge and Upper Funshion Rivers.</p> <p>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 is also likely to have accounted for some of the improvement in water quality observed in the Funshion in recent years. This is likely to act in conjunction with the Kildorrery WWTP to further improve water quality in the Funshion catchment.</p>
<p>Describe any likely changes to the site arising as a result of:</p> <ul style="list-style-type: none"> Reduction of habitat area; Disturbance of key species; Habitat or species fragmentation; Reduction in species density; 	<p>There will be no loss of or reduction in Annex I habitats as a result of the operation of the existing WWTP. The Funshion River is not contained within the cSAC boundary, but a number of qualifying species may still be found within the sub-catchment.</p> <p>The potential nutrient enrichment of the Blackwater of this location may</p>

<p>Changes in key indicators of conservation value; Climate change.</p>	<p>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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. • White-clawed Crayfish – Not known from the Funshion River <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Atlantic salmon 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. 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. Levels of algae and macrophytes in the Funshion were moderate, this being related to historical nutrient input to the river. Current improved levels of water treatment and reduced use of fertilizer in the coming years will lead to a reduction in instream vegetation. This is a positive trend.</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 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.</p>

	<p>The Kildorrery plant is currently operating at optimal efficiency and generating a high quality effluent with low nutrient concentrations. The Funshion is a relatively large waterbody at this location with good ecological conditions now prevailing along its length. No evidence of gross eutrophication downstream of the plant was observed in the Funshion during field surveys.</p> <p>An overall improvement in ecological conditions has been observed in the Funshion in recent years, this being related in part to improvements in waste water treatment in the catchment; this is likely to continue over the next several years and is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey).</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 Kildorrery WWTP is generating an excellent effluent for the scale of the plant. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.</p> <p>In the context of other discharges to the Funshion in the overall vicinity, the Glanworth WWTP is similar in scale and occurs 10km downstream. Whilst being underloaded, the Glanworth plant is occasionally non-compliant for BOD, SS and COD. P and N levels in the effluent are also quite high. However, the Funshion is expected to have a high assimilative capacity for such input and the degree of geographical separation of the Kildorrery and Glanworth plants means that negative cumulative impacts are insignificant. The Funshion displays High ecological status at Kilworth, just upstream of the Blackwater confluence. Such elevated water quality entering the Blackwater will contribute to maintaining good ecological conditions in the main channel.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Kildorrery discharge are envisaged and therefore no further assessment is required.</p>

Appendix 19 – Killavullen Screening

EPA Ref: D0447-01

Project	
Location	Discharge associated with agglomeration of Killavullen village, County Cork.
Distance from designated site	0km: Killavullen WWTP discharges to the Ross River, inside the cSAC boundary.
Brief description	<p>Killavullen is a village on the south-eastern side of Mallow, 44km from Cork City and 20 km from Fermoy. It is a predominately rural agricultural village, and other than a few minor developments has not experienced any major housing developments during recent years.</p> <p>The wastewater in Killavullen is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the village gravitates to the wastewater treatment plant.</p> <p>Killavullen WWTP is designed for a Population Equivalent (PE) of 1,000, which was commissioned in late 1999. Activated Sludge is the process employed at the Killavullen waste water treatment plant.</p> <p>Influent initially gravitates into a grit trap, which is followed by an inline muncher. From here the influent enters the inlet sump, from where the influent is pumped to a steel circular aeration tank. The effluent then flows into the settling tank with rotating half bridge scrapper. The solids settle while the supernatant flows over the weir and discharges via V-notch Box to the river.</p> <p>The pollution load for the Killavullen agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & crèches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP.</p> <p>The final effluent is discharged to the River Ross, which is adjacent to the wastewater treatment plant site.</p> <p>The plant currently services an agglomeration with an estimated PE of 700, based on hydraulic loading, and is therefore underloaded.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

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 Killavullen agglomeration receives secondary treatment at the WWTP, before discharging to the Ross River, 500m upstream of the Blackwater River. The effluent then disperses in the water column.</p> <p>The Ross River is a minor waterbody at this location (2-3m wide). 2009 EPA sampling at a location downstream of the WWTP indicate and improvement in conditions since 2006. Good ecological conditions are now seen to prevail in the river. WFD status of 'Moderate' applied to the river in the WMU refers to 2006 ecological status, and would be expected to be revised upward given the improved condition of the river.</p> <p>The Ross River flows into the main Blackwater channel some 500m downstream of the WWTP. An observation of the Blackwater at this location, indicates that the river is major in scale (>18m wide) with moderate flows and occasional riffles over gravel beds. The banks of the river display mature riparian treelines. The Blackwater displays High ecological status upstream of the Ross River confluence and is thus considered to have assimilative capacity at this location.</p> <p>Killavullen is located 9km downstream of Mallow, where a number of pressures combine to seriously reduce water quality in the environs of the town. Biological recovery is seen to develop within 3km of the town and High conditions are restored upstream of Killavullen. A population of Freshwater Pearl Mussels is known from near Killavullen Bridge, 800m upstream of the Ross River confluence.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following effluent levels from 2009 in mg/l:</p> <ul style="list-style-type: none"> • BOD = 14 • SS = 16 • COD = 61 • P = 4 • N = 19.2 <p>As such, the plant is compliant according to UWWT thresholds. Sampling upstream and downstream of the discharge on the Ross River indicated that no measurable changes to water chemistry were apparent; the Ross River is afforded High WFD status downstream of the WWTP for BOD, Ammonia and Orthophosphate. Given that no changes to the water quality of the Ross River have been recorded, it is reasonable to suggest that in the perspective of the receiving Blackwater River, no impacts will occur here either. The Blackwater at this location is a sizeable waterbody with large dilution factors.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Killavullen WWTP and as such it is considered to be generating an effluent which is acceptable from a fisheries perspective.</p> <p>The Second Draft Freshwater Pearl Mussel Sub-Basin Plan does not list the Killavullen WWTP as being a risk to Freshwater Pearl Mussels in the Blackwater River.</p>
<p>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with</p>	<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>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>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>The Killavullen WWTP discharge is very small in scale in the context of the Blackwater River to which the Ross River flows. High ecological status is found in the Blackwater at this location, indicating a high assimilative capacity. It is considered that the degree of nutrients contributed to the Blackwater at this location is negligible and thus insignificant in relation to Pearl Mussels in the main channel.</p> <p>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.</p> <p>The Ross River descends rapidly down a steep valley in the Nagles Mountains. The only other major pressure on this subcatchment is related to commercial forestry in the aforementioned mountain range. As phosphorus levels in the river are low at the upstream WWTP sampling site, it is reasonable to conclude that nutrient input in the headwaters of the river from forestry operations is minimal at present.</p>
<p>Describe any likely changes to the site arising as a result of:</p> <ul style="list-style-type: none"> Reduction of habitat area; Disturbance of key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value; 	<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 River Blackwater at 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 - Not known from the Ross River or the receiving stretch of the Blackwater River. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter.</p> <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. The Killavullen discharge is very small in scale and is not considered to be contributing significant nutrients to the Blackwater. It is not listed as a risk in the Freshwater Pearl Mussel Sub-basin Plan.</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. These impacts have been noted immediately downstream of Mallow Town, before biological recovery is apparent in sampling at Killavullen.</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 species which have also been recorded in the overall Blackwater catchment. Macrophytes were not observed in great numbers in the Ross River at this location and eutrophication is not considered to be an issue.</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 overall Blackwater catchment is under threat from a variety of sources, including run-off from intensive agriculture, especially in the well known agricultural area known as the Golden Vale. Nutrient run-off, sedimentation and acidification from forestry also put pressure on the river further up its reaches, where substantial areas of the catchment are under coniferous cover. Up until recently, the level of treatment of sewage being discharged to the river Blackwater 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 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.</p> <p>The Killavullen WWTP is relatively small in scale and generates a compliant effluent. Despite not incorporating a nutrient removal phase, no measurable increase in Phosphorus or Nitrogen was detected in the Ross River. It is not envisaged that the discharge will interfere with the key ecological relationships that define the structure or function of the cSAC.</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 Killavullen WWTP is a relatively modern installation and is generating a good quality effluent. Ecological conditions have been seen to be improving in the Ross River in recent years, which may be indicative of improved effluent quality following the plant upgrade in 2001. The main Blackwater River is in High ecological condition at Killavullen and receives water of Good ecological quality from the Ross River; this is not expected to alter the chemical or ecological status of the receiving Blackwater.</p> <p>Negative cumulative pressures on the Ross River are considered to be negligible. The Killavullen plant is not predicted to be acting in combination with the Marlow Blackwater discharge 9km upstream.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Killavullen discharge are envisaged and therefore no further assessment is required.</p>

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Appendix 20 – Kilworth Screening

EPA Ref: D0334-01

Project	
Location	Discharge associated with agglomeration of Kilworth village, County Cork.
Distance from designated site	0km: WWTP discharges to the Douglas River, at the cSAC boundary. The Blackwater Callows SPA is coincident with the cSAC, downstream of Fermoy.
Brief description	<p>The village of Kilworth is situated 1km off the main Dublin - Cork National Route, N8, circa 5km north of Fermoy. The village is predominately rural in setting, however the village has expanded in recent years with the development of housing estates within the agglomeration.</p> <p>The wastewater in Kilworth is collected in a partially combined foul and separate foul sewerage drainage network. The partially separate collection system presently has five ejector stations pumping into the main sewer that gravitates to the wastewater treatment plant. One of the ejector stations pumps directly to the manhole directly up gradient of the existing inlet works.</p> <p>The wastewater treatment plant is located at the end of an un-surfaced access lane through a farm at the eastern end of the village in the townland of Knockanohill. The plant is not visible from the road. The area of the site is approximately 1 acre.</p> <p>Kilworth WWTP is designed for a Population Equivalent of 2,500, which was commissioned in January 2009. Activated Sludge is the process employed at the Kilworth waste water treatment plant. Influent initially gravitates into an inlet sump, which consists of an automatic inlet sump. After effluent enters the sump the effluent is pumped to the aeration tank. Following the aeration tank the effluent overflows to the adjacent clarifier tank, which is equipped with a half bridge sludge scrapper. Tertiary treatment is the final stage in the treatment process and this consists of 2 Nr Sand Filters. Final effluent is discharged to the River Douglas.</p> <p>The pollution load for the Kilworth agglomeration arises from the following</p> <ul style="list-style-type: none"> • Domestic population • Commercial premises • School & crèches • Infiltration <p>Currently the WWTP is an average DWF of 240m31d entering the plant. Based average hydraulic load of 200l/dip, the PE equates to 1,200. The plant is therefore significantly underloaded.</p>

<p>Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?</p>	<p>No</p>
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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 Kilworth agglomeration receives tertiary treatment at the new WWTP, before discharging to the Douglas River. The effluent then disperses in the water column.</p> <p>An observation of the Douglas downstream of the WWTP revealed that at this location, the river is relatively minor in scale (2-3m wide) with moderate flows over occasional riffles along a shallow incline. Some aquatic macrophytes were observed, including Water crowfoot; no algal mats were observed. Water quality appeared in good condition.</p> <p>The most recent EPA water quality sampling data from 2009 indicates that the Douglas River displays good (Q=4) ecological conditions downstream of the discharge point, at Douglas Bridge. This represents an improvement since the previous survey in 2006, when only Moderate conditions (Q=3-4) were found. These earlier results predate the upgrade of the plant. The overall ecological status of the Douglas catchment is now listed by the EPA as satisfactory with only high and good ecological conditions recorded.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application from 2009 indicates the following effluent levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = <2 • SS = 1 • COD = 26 • P = 0.63 • N = n/s <p>These are excellent values for a treatment plant on the scale of Kilworth.</p> <p>The Water Framework Directive currently assigns 'Moderate' status to this sub-catchment of the Douglas; this is based on historical results for aquatic macroinvertebrate diversity found in this area. This does not take into account observed improvements to water quality recorded in late 2009 following the WWTP upgrade.</p> <p>Under consultation, IFI had no concerns regarding the current effluent from the Kilworth plant.</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: Size and scale; Land-take; Distance from Natura 2000 site or key features of the site; Resource requirements;</p>	<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</p>

<p>Emissions; Excavation requirements; Transportation requirements; Duration of construction, operation etc.;</p> <p>Others.</p>	<p>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>Kilworth is small village surrounded by agricultural pasture lands; the banks of the Douglas downstream of Buttevant are dominated by mature broadleaf woodland which is likely to buffer against any fertilizer run-off from surrounding pasture. The Douglas River is a short river, the source being only 6km to the north in the Kilworth Mountains, descending rapidly down a forested gorge to the Blackwater Valley.</p> <p>No other WWTP discharges are located in the immediate part of the sub-catchment. No other major industrial discharges occur in this stretch of the Douglas. The only other cumulative pressures are considered to come from forestry in the upper reaches of the river, and from agriculture in the Blackwater Valley. High ecological quality is recorded at the base of the River Douglas valley; as such, negative pressure from forestry activities in the Kilworth Mountains is not envisaged.</p> <p>The Douglas/ Araglin Rivers enter the Blackwater downstream of Fermoy, where a major WWTP (Design PE of 20,000) and several industrial discharges are located. The Fermoy plant was most recently upgraded in 2006 and features Tertiary treatment. It is predominantly compliant with the WWTP Regulations (the Blackwater is classed as a 'Sensitive River' at this location. No increases in BOD, Ammonia or Orthophosphate result from the current effluent discharge at Fermoy. 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 WWTP. The high quality effluent entering the Douglas River and subsequently Blackwater River from Kilworth is not considered to be acting in cumulative manner with the Fermoy discharge.</p> <p>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</p>
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	<p>water quality observed in the upper Douglas in recent years. However, the tertiary upgrade to the Kilworth plant is still likely to be the most significant contributor to the observed Q-rating increase at Douglas Bridge.</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; Climate change.</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 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 – Not known from the Douglas/Araglin sub-catchment. <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 Careysville. The modern Kilworth plant features tertiary treatment and the effluent contains very low levels of phosphate. As such, the plant is not considered to be contributing to notable nutrient input to the Blackwater and cannot be considered to be negatively affecting the Pearl Mussel population therein. The new Kilworth plant is currently contributing to an improvement in water quality in the Douglas; this is likely to improve the river habitat for the above species, and is construed as a positive impact.</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 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.</p> <p>The Kilworth plant is currently significantly underloaded and generating a high quality effluent with low nutrient concentrations. Good to High ecological conditions now prevail along the length of the River Douglas, with a noted improvement since the commissioning of the new WWTP. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and Otter).</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 Kilworth WWTP is a modern installation and is generating an excellent effluent for the scale of the plant. Efficient tertiary treatment means that it is unlikely to be contributing to significant nutrient input to the overall Douglas/Araglin sub-catchment. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in nutrient input.</p> <p>Negative cumulative pressures on the River Douglas are considered to be negligible. The Kilworth plant is not predicted to be acting in combination with the Fermoy Blackwater discharge.</p> <p>The screening exercise concludes that no significant impacts to the Blackwater River cSAC resulting from the Kilworth discharge are envisaged and therefore no further assessment is required.</p>

Appendix 21 – Mallow Screening & Assessment

EPA Ref: D0052-01

Project	
Location	Discharge associated with agglomeration of Mallow Town, County Cork.
Distance from designated site	0km: Mallow WWTP discharges to the River Blackwater, inside the cSAC boundary.
Brief description	<p>The wastewater in Mallow 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 drains to a pumping station at Mallow Bridge, which is then pumped to the WWTW.</p> <p>The Mallow WWTP is designed for a Population Equivalent (PE) of 18,000PE and BOD loading of 1,080 Kg/day. The maximum hydraulic capacity of the Mallow WWTP is 556m³/h which is 2.5 Dry Weather Flow (2.5DWF). In order to cope with flows above 2.5DWF storm storage has been provided at the WWTW. The volume of storm storage at the WWTW is approximately 1,012m³. In the event that the storm water holding tanks are filled and the storm continues, the storm water tanks are operated as a pre-clarification tank without sludge removal. The overflow from the storm water storage tank is connected to the final effluent outlet pipe. The existing WWTW were upgraded in 2006 with an additional stream. The flow is split after the wastewater passes through the new inlet works. 50% of the flow is diverted to the existing wastewater treatment stream. The remaining 50% is directed to a new treatment system. The existing stream has an aeration phase, a secondary settlement phase and return activated sludge phase.</p> <p>The pollution load for the Mallow 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. The domestic population of Mallow 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 Mallow Town and environs now has a population in excess of 7,091 (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 estimated agglomeration of Mallow Town is currently 14,000PE and the WWTW is therefore underloaded.</p>

	On May 3rd 2011, the plant and associated pumping stations were 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 Fermoy WWTP.
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

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 Mallow agglomeration receives tertiary treatment at the WWTW, before discharging to the River Blackwater. The effluent then disperses in the water column.</p> <p>An observation of the Blackwater downstream of the WWTW revealed that at this location, the river is major in scale (>15m wide) with moderate flows and occasional riffles over gravel beds. The banks of the river display mature riparian tree lines.</p> <p>There is no recent EPA sampling downstream of the WWTW. Upstream of the plant, the Blackwater only displays Moderate ecological conditions (Q=3-4) at the Mallow Railway Bridge. This is a notable decrease from the next sampling site upstream at Longfield's Bridge, where High ecological status was recorded.</p> <p>A number of other pressures on the water quality of the Blackwater occur along this stretch upstream of the WWTW which may account for this observed impact; these are discussed later in this assessment.</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following effluent levels from 2009 in mg/l:</p> <ul style="list-style-type: none"> • BOD = 7.1 • SS = 28 • COD = 34 • P = 2.4 • N = 3.5 <p>As such, the plant is compliant for BOD, SS and COD. However, as the Blackwater is designated as 'Sensitive' between Mallow and Ballyduff, the values for P and N are non-compliant. Other samples of the effluent between 2007 and 2010 indicate that phosphate levels vary between compliance and non-compliance, with levels as high as 3.5mg/l recorded.</p> <p>The main channel of the Blackwater is designated as a Salmonid River in the European Communities (Quality of Salmonid Waters) Regulations, 1988. Downstream sampling indicates that the Mallow plant is compliant with these regulations.</p> <p>In relation to the water quality variables detailed in the 2009 Surface Water Regulations, no increases in Ammonia or Orthophosphate result from the current effluent discharge at Mallow. However, 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</p>
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	<p>classed as 'Poor' upstream of the WWTP; sampling data from the Mallow licence application shows a 0.2mg/l increase in BOD levels in the river.</p> <p>The Blackwater at this location is a sizeable waterbody with large dilution factors; however, ongoing elevated inorganic nutrient input is likely to be leading to localised eutrophication of the river downstream of Mallow.</p> <p>Under consultation, Inland Fisheries Ireland made specific reference to the Mallow WWTW as potentially having a negative impact on the Blackwater River. The plant has been the subject of a number of reports to IFI over recent years from members of the general public regarding visibly unsatisfactory discharges from its outfall. Following IFI correspondence Cork Co Co, most of these incidents have been attributed to breakdowns/faults at the plant leading to the release of poorly treated effluent to the river.</p> <p>The Water Framework Directive assigns 'Moderate' status to the Blackwater River; this is based on the presence of a non-recruiting population of Freshwater Pearl Mussels near in the Blackwater in the vicinity of Mallow Town. A concentration of known colonies exists near Mallow between the former Sugar Factory at Newberry, to Ballymagooly downstream of the town. Densities in this stretch have been recorded as high as 50-60 individuals per square metre.</p> <p>The Second Draft Freshwater Pearl Mussel Sub-Basin Plan lists the Mallow WWTW as potentially having an adverse effect on the pearl mussel, given that there are records of this species in close proximity downstream of the plant. Pearl mussel populations require rivers to have an extremely low nutrient concentration to facilitate reproduction. There is clear evidence of a reduction in water quality due to urban-related discharges around Mallow.</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>The Mallow agglomeration is very large in scale, and while the WWTW is technically underloaded, effluent sampling has noted frequent non-</p>

compliant levels of phosphate and nitrogen. It is therefore likely that it is contributing to elevated levels of organic and inorganic eutrophying nutrients which enter the Blackwater closely upstream to a large number of freshwater pearl mussel colonies.

Furthermore, despite recent upgrade works to the plant, there has a series of reports of poor water quality downstream of the plant resulting from improperly treated effluent due to technical faults and/or overflows. This is likely to have a localised direct impact on numerous species in the environs of Mallow town, via temporary deoxygenation of the water column and disruption of the river substrate through sedimentation.

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.

Mallow Town also contains a number of large industrial complexes with IPPC licences. These are the Dairygold, Micam and Road Binders installations.

The Dairygold plant is a milk processing facility. Milk and milk products are delivered in bulk tankers to the site for separation and pasteurisation. The pasteurised milk is sent off-site for distribution and the cream from the separation process is sent to storage silos for use in the milk powder, yellow fats, and butteroil manufacture. Powder manufacture involves the evaporation and drying of milk to 97% solids. Full cream powder, skim and standard milk powder and buttermilk powder are dried in the Niro, Roller and Rogers dryers respectively. The powders are then bagged prior to despatch. The plant contains an integral WWTP. Process effluent and cooling water from the site is directed to the WWTP. This is located south of the dairy processing centre and approximately 400m from the River Blackwater. The effluent flows through a magnetic flow meter into the inlet sump and a flow proportional sample is accumulated over a 24 hour period. This sample is tested for COD and pH daily and for phosphate on a weekly basis. The WWTP consists of two dissolved air floatation tanks, a DAF fats storage tank, a balance tank, pH neutralisation, two biotowers, two settlement tanks, two alternating double filters, phosphate removal (addition of aluminium chloride) and two humus tanks prior to discharge to the River Blackwater.

The Roadbinders plant manufactures a range of cationic emulsions for use in the road construction and maintenance industry. Waste water is discharged to the public sewer. While there are no surface discharges, the EPA inspector reported noted some potential pollution sources at the site including solidified tar in a small stream adjacent to the site and some abandoned vehicles with associated oil spills.

	<p>Micam (Mica & Micanite (Ireland) Ltd.) manufacture Industrial Laminates, Plastic Machined Components and Printed Circuit Boards (PCBs) at their site in Sean Moylan Park, Mallow. A feature of this site is the fact that the company make their own copper clad laminates for PCB manufacture. The plant features an integral WWTP which treats waste water on-site before discharging to the sewer network for further treatment at Mallow WWTW. PCB manufacture ceased in March 2011 and as result there is longer any process effluent being discharged to the sewer network, only municipal sewage.</p> <p>The decommissioned Irish Sugar Factory and associated lagoons are also located to the west of the town. It is planned that the existing lagoons at the site will be filled in and the site rehabilitated for future use as agricultural land.</p> <p>One large quarry is located directly beside a pearl mussel population. This is the J.A. Wood at Lackanamona in Mallow. This is an extremely large quarry which extracts rock and is located adjacent to a Pearl Mussel stretch. Sediment-loaded run-off is a risk at this location.</p> <p>Mallow racecourse has a small scale abstraction for sprinklers which are operated 2-3 days prior to a race meeting. This is in close proximity to the freshwater Pearl Mussel population.</p> <p>All of the above are likely to, act in combination to some degree to put pressure on the water quality in the environs of Mallow Town. This is of key importance to the viability of the Pearl Mussel population in the Blackwater at this location.</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; Climate change.</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 River Blackwater at 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 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 <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter. Crayfish were recorded in the lowest stretch of the Ballyclogh Stream in 2009 (4km upstream of Mallow). It is unclear whether this is the result of an intentional translocation, or a previously unknown naturally occurring sub-population. It may also indicate the presence of crayfish in the main Blackwater channel in the stretch of the river.</p> <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. The influence of organic and inorganic nutrients entering the Blackwater from the Mallow WWTW discharge</p>

	<p>may contribute to depressing the reproductive capacity of the Blackwater pearl mussel population.</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. While no obvious gross eutrophication was observed, a reduction in macroinvertebrate diversity recorded by the EPA at the railway bridge upstream of the WWTW is likely to be found in the overall vicinity of the town, before biological recovery is apparent in sampling downstream at Killavullen.</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 species which have also been recorded in the overall Blackwater catchment. Macrophytes were not observed in great numbers in the Blackwater at this location, though the depth of the river meant submerged vegetation could not be ruled out.</p> <p>Crayfish sensitivity to changes in water quality can result in significant losses following pollution incidents. Eutrophication can lead to luxuriant plant growth, which in turn traps silt and can result in deoxygenation at night, leading to loss of crayfish habitat. The presence of crayfish in the main Blackwater channel in the vicinity of Mallow Town is unclear.</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 overall Blackwater catchment is under threat from a variety of sources, including run-off from intensive agriculture, especially in the well known agricultural area known as the Golden Vale. Nutrient run-off, sedimentation and acidification from forestry also put pressure on the river further up its reaches, where substantial areas of the catchment are under coniferous cover. Up until recently, the level of treatment of sewage being discharged to the river Blackwater 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 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.</p> <p>While the Mallow WWTW is capable of generating UWWT-compliant effluent, there is a concern over the levels of inorganic nutrients still found in the effluent. Ongoing nutrient input in the vicinity of the Blackwater pearl mussel population will lead to progressive ageing of the population without recruitment and eventual extinction. BOC assimilative capacity is also reduced by other pressures immediately upstream of the plant and this is reflected in reduced macroinvertebrate diversity is</p>

	<p>samples taken at the railway bridge.</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 Mallow WWTW is underloaded and generates an effluent which is generally compliant for BOD, COD and SS; however, P and N levels may frequently be above tolerable thresholds for this sensitive stretch of the Blackwater which is under pressure from a number of other sources. Localised impacts to qualifying species of the SAC (particularly the Pearl Mussel) may be significant due to the high vulnerability of these species to the effects of nutrient enrichment. In-combination factors may also be an issue, given the urbanised and industrial nature of Mallow Town. The WWTW has been the cause of a number of pollution incidents in recent years. Other point pressures in the area include three IPPC-licensed facilities in Mallow Town, and the Glantane, Cecilstown, Lombardstown and Ballyclogh WWTPs which all discharge to the Blackwater or its tributaries within a 10km radius of Mallow.</p> <p>Pollution events as have been reported are likely to cause temporary major deoxygenation of the river and/or siltation of the river bed. In serious cases, this will lead to fish kills, loss of macroinvertebrate diversity and further negative impacts to Pearl Mussels downstream of Mallow through direct mortality of adult specimens.</p> <p>The screening exercise therefore concludes that further assessment 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>

<p>Stage 2 - Project Assessment</p>	
<p>Describe the elements of the plan that are likely to give rise to significant effects on the site</p>	<p>Waste water treatment plants can contribute significant nutrient and organic loads to rivers. There is potential that the Mallow WWTW is in combination with other activities within the Blackwater River catchment is leading to increased levels of nutrients in the main channel of the Blackwater and/or causing occasional serious pollution incidents.</p>
<p>Set out the conservation objectives of the site</p>	<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> (Alno-Padion, Alnion incanae, Salicion albae) (91E0); <i>Taxus baccata</i> woods of the British Isles (91J0); Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation (3260); Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</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>); Twaite 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 users and relevant authorities. <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>Describe how the project will affect key species and key habitats</p>	<p>Of key concern in relation to the Mallow WWTW is a potential negative impact to the Freshwater Pearl Mussel, which acts as an indicator species for the SAC. This species requires stable cobble and gravel substrate with very little fine material below pea-sized gravel. Adult mussels are two-thirds buried and juveniles up to five to ten years old are totally buried within the substrate. The lack of fine material in the river bed allows for free water exchange between the open river and the water within the substrate. The free exchange of water means that oxygen levels within the substrate do not fall below those of the open water. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels. The clean substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. Organic particles within the substrate can exacerbate the problem by consuming oxygen during the process of decomposition. The habitat must be free of filamentous algal growth and rooted macrophyte growth. Both block the free exchange of water between the river and the substrate and may also cause night time drops in oxygen at the water-sediment interface. The open water must be of high quality with very low nutrient concentrations, in order to limit algal and macrophyte growth. Nutrient levels must be close to the reference levels for the river they inhabit. Phosphorus must never reach values that could allow for sustained, excessive filamentous algal growth. The presence of sufficient salmonid fish to carry the larval glochidial stage of the pearl mussel life cycle is essential.</p> <p>A number of surveys have identified numerous pearl mussel colonies in the environs of Mallow Town. Reproductive success in this population is negligible, owing to historic pollution of the river and ongoing elevated inorganic nutrient levels in the water column.</p>

	<p>Several instances of the Mallow plant producing a poor quality effluent have been reported, releasing sediment and organic material to the river. This may affect any of the qualifying interests through direct deoxygenation of the river or accumulation of sediment.</p> <p>The inorganic content of the discharge is also sometimes above compliant thresholds (and thus significantly above what may be considered optimal for Freshwater Pearl Mussel), and is likely to be leading to ongoing negative pressure on the local mussel population.</p> <p>In relation to the other qualifying species of the Blackwater cSAC, 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. Such changes are likely to affect stocks of salmon within the river, a qualifying species that is already under pressure in the catchment. Lamprey, which also require high water quality with low levels of sediment are also likely to be similarly affected.</p> <p>Reduction or changes in overall fish stocks will have subsequent effects on predators, most notably otter, for which the site is also designated.</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>Elevated levels of suspended solids from effluent discharges pose a risk to salmon and lamprey recruitment where settlement on spawning gravels and/or redds may occur.</p> <p>The Blackwater does appear to show reasonably rapid biological recovery, and displays High ecological quality in Killavullen. However, even localised effects around Mallow may be considered significant, as pearl mussel are sedentary at this location, while Salmon and Lamprey must migrate through any such areas of depleted water quality.</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>The key ecological relationships that define the structure and function of the Upper Blackwater as part of the cSAC as a whole are likely to be impacted by potential nutrient enrichment. However, given the minor scale of the discharge, systemic disturbance is not envisaged.</p> <p>The critical matter relating to the Mallow WWTW concerns the threat posed to remnant Freshwater Pearl Mussel populations found in the Blackwater downstream of the town. EPA sampling of the Blackwater shows that there is a decrease in ecological status from High to Moderate as one proceeds downstream through Mallow town. Nutrient input and stochastic pollution events occurring at the WWTW is likely to exacerbate this issue.</p> <p>The Blackwater remains an open Salmon fishery, indicating Inland Fisheries Ireland's opinion that the species remains in harvestable surplus for the catchment. The assimilative capacity of the Blackwater for nutrients is high overall, but localised deoxygenation of the water column or clogging of the waterbody with macroalgae and macrophytes may be considered a significant impact to migrating and spawning salmon. Lamprey are known to require equitable water quality standards to salmon. There is the risk of direct impacts to these fish species in the event of further pollution events at the WWTW. However, these are infrequent and increased diligence at the plant in the past 18 to 24 months and into the future will negate such risks. Mobile species such as lamprey and</p>

	<p>salmon are likely to avoid stretches of decreased water quality.</p> <p>Reduction in key diet species such as salmonids may negatively affect otter populations in the catchment. Competition with the invasive non-native mink may act in combination in this regard. As noted above, fish stocks are unlikely to be affected in the future due to increased diligence and thus pressure on the local otter population is more likely to result from disturbance by humans in the vicinity of Mallow Town.</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 stated, increased operational diligence at the WWTW should effectively reduce the risk of future major pollution events. IFI highlighted these issues in consultation.</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. The Freshwater Pearl Mussel Sub-basin Plan makes specific reference to investigating the need for nutrient removal at the plant, owing to the proximal downstream presence of pearl mussels. However, there are no plans to incorporate further nutrient removal phases at the plant.</p>
<p>Conclusion</p>	<p>In conclusion, the potential negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Mallow WWTW discharge (in combination with other pressures located in the environs of Mallow Town) is considered a potentially significant impact. This is in contravention of Conservation Objective Number 2 for the cSAC.</p> <p>This is a highly urbanised centre with an industrial aspect, where river quality is recorded as decreasing upstream of the plant; this is indicative of reduced assimilative capacity for the WWTW discharge.</p> <p>Another issue is the recorded levels of P and N entering the river at this location. Dilution factors in the Blackwater are high at this location, but the sheer number Pearl Mussel</p> <p>The assessment therefore concludes that due to likely impacts to Freshwater Pearl Mussel, the possibility of significant impacts to the Blackwater River cSAC cannot be discounted at this stage.</p>

Appendix 22 – Millstreet Screening & Assessment

EPA Ref: D0332-01

Project	
Location	Discharge associated with agglomeration of Millstreet Town, County Cork.
Distance from designated site	1km: WWTP discharges to the Tanyard, upstream of the cSAC boundary.
Brief description	<p>Millstreet is a key settlement for the rural hinterland of North Cork and is located approximately 50 km from Cork City and 20km north of Macroom. The town is strategically located at the intersection of two regional roadways and also has rail access to the Mallow - Tralee Rail Line. In recent years there has been a marked increase in residential development in the town.</p> <p>The wastewater in Millstreet is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from the town gravitates to the wastewater treatment plant located approximately 10 km north of the town centre. There are four number pumping stations within the agglomeration of Millstreet.</p> <p>Millstreet WWTP is designed for a Population Equivalent (PE) of 1,600, which was commissioned in early 1970's. Extended Aeration is the process employed at the Millstreet waste water treatment plant. Influent initially gravitates into a via a 450mm diameter sewer to the inlet chamber/ storm overflow chamber, from this chamber influent gravitates to the oxidation ditch. Mixed liquor overflows the oxidation ditch via an adjustable weir to 2 Nr hopper shaped settlement tanks. Treated effluent from the settlement tanks is discharged to the adjacent Tanyard Stream.</p> <p>The pollution load for the Millstreet agglomeration arises from the following areas:</p> <ul style="list-style-type: none"> • Domestic population • Industrial • Commercial premises • Institutional - School & crèches • Infiltration <p>The sewerage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP. The final effluent is discharged to the Tanyard Stream, which is adjacent to the wastewater treatment plant site.</p> <p>The plant currently services a PE of 2,252 based on hydraulic loading and is therefore significantly overloaded.</p>
Is the plan directly connected with or	No

necessary to the Natura 2000 site management for nature conservation?	
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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 Millstreet agglomeration receives secondary treatment at the WWTP, before discharging to the Tanyard Stream, a tributary of the Finnow and Blackwater Rivers. The effluent then disperses in the water column.</p> <p>The Tanyard Stream is very minor water body (1m wide) which flows from the southeast through the townland of Liscahane, and through Millstreet Town. It exhibits slow to moderate flows in the environs of Millstreet. The stream descends from the upland area southeast of Millstreet and is naturally highly oligotrophic.</p> <p>EPA sampling of the Finnow at Wallis's Bridge, 1.5km downstream of the WWTP indicates good overall ecological quality (Q=4).</p> <p>Sampling data for the discharge provided by Cork County Council with the Licence Application indicates the following mean effluent levels from 2007-09 in mg/l:</p> <ul style="list-style-type: none"> • BOD = 38 • SS = 10 • COD = 47 • P = 0.7 • N = 5.8 <p>These are overall compliant for the UWWT thresholds. However, a number of sampling instances indicate a rise in orthophosphate in the stream from below detectable levels (<0.05 mg/l) to 0.08 mg/l or above. This is indicative of probable elevated concentrations of phosphorus in the effluent which only receives secondary treatment. Given that the Tanyard Stream contains naturally very low levels of nutrients, nutrient input from the effluent may not be detected in some instances.</p> <p>In relation to the water quality variables detailed in the 2009 Surface Water Regulations, sampling indicates no increases in BOD, Ammonia or Orthophosphate result from the current effluent discharge at Millstreet. As such, the WWTP is technically not contributing to decline in water quality and is therefore compliant with the regulations. However, the Millstreet plant is listed in the Blackwater WMU as an 'At Risk' point source due to "Insufficient existing assimilative capacity (BOD), evidence of impact, discharge to a protected area" and "Insufficient existing assimilative capacity (nutrients), evidence of impact, discharge to a protected area".</p> <p>The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in lower concentrations than if no treatment were to be applied.</p>
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	<p>Under consultation, Inland Fisheries Ireland made specific reference to the Millstreet WWTP insofar that it is currently operating beyond its design capacity.</p> <p>The Millstreet WWTP is referenced by the Freshwater Pearl Mussel Sub-basin plan as being “located upstream of the mussel population. The load is above the plant capacity, requires investigation and upgrade with the overall aim of reducing overall sediment, organic and nutrient load”. This refers to one known occurrence of Pearl Mussel at Keale Bridge on the Blackwater, 1.5km downstream of the Finnow confluence.</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>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.</p> <p>ALPS Electric Ireland run an IPPC-licensed facility in Millstreet. Wastewater from this installation is processed at the Millstreet WWTP; there is no discrete discharge to surface waters.</p>
<p>Describe any likely changes to the site arising as a result of:</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>Reduction of habitat area; Disturbance of key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value; Climate change.</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 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 – Not found in upland peaty and acidic rivers such as the Clyda River/Cummeen Stream <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. There are pearl mussel populations in the main Blackwater channel downstream of the Finnow River confluence, at Keale Bridge. The Millstreet plant is overloaded beyond its design capacity, and levels of orthophosphate downstream of the plant have been recorded periodically elevated. While the Finnow River is likely to have a high assimilative capacity, shows good macroinvertebrate diversity and little evidence of eutrophication, it may be transmitting phosphate from the Millstreet plant to the Blackwater where impacts to Pearl Mussel populations are possible.</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. As stated, there is little evidence of such impacts in the Finnow River, and no impacts to migrating salmon are envisaged. The Tarbert Stream is naturally oligotrophic and may supply some minor spawning habitat in its upper reaches.</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 species which have also been recorded in the overall Blackwater catchment. No macrophytes were observed in the Tarbert Stream, this being indicative of the low levels of nutrients found in the waterbody upstream of Millstreet.</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;</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</p>

<p>Interference with key relationships that define the function of the site.</p>	<p>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 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.</p> <p>The Finnow River is overall in satisfactory condition, reflecting the relatively low level of negative pressures along its length. However, the overloaded Millstreet plant is located only 3.5km upstream of the Pearl Mussel population in the Blackwater River at Keale Bridge. The lack of nutrient removal via tertiary treatment at the Millstreet WWTP is noted as potentially contributing to reproductive failure in these populations. The overloaded status of the plant may also have implications during shock loading during which increased suspended solids may be released to the Tarbert Stream.</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>While the Millstreet WWTP discharge appears generally compliant from sampling data, the fact that the plant is overloaded and potentially contributing elevated levels of inorganic nutrients in close proximity to Pearl Mussel populations, is a key factor to be considered. The Blackwater of Keale Bridge is still moderate in scale when compared to further downstream and is likely to have a comparatively lower assimilative capacity for inorganic nutrients.</p> <p>Given the fact that the Millstreet WWTP is currently overloaded and in need of upgrade and nutrient removal, combined with the fact that at least one Pearl Mussel population is found in close proximity to the Blackwater-Finnow confluence, the screening exercise concludes that further assessment should be carried out in Stage 2 below.</p> <p>This assessment considers the potential impacts of the discharge with specific reference to the species and/or habitats which may be impacted.</p>

<p>Stage 2 - Project Assessment</p>	
<p>Describe the elements of the plan that are likely to give rise to significant effects on the site</p>	<p>Waste water treatment plants can contribute significant nutrient and organic loads to rivers. There is potential that the discharge from the Millstreet WWTP is, in combination with other activities within Blackwater River catchment, leading to increased levels of nutrients in the main channel of the Blackwater. This may lead to ongoing eutrophication of the river.</p>
<p>Set out the conservation objectives of the site</p>	<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</p>

	<p>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> (Alno-Padion, Alnion incanae, Salicion albae) (91E0); <i>Taxus baccata</i> woods of the British Isles (91J0); Watercourses of plain to montane levels with the <i>Ranunculum fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation (3260); Estuaries (1130); Mudflats and sandflats not covered by seawater at low tide (1140); Salicornia and other annuals colonizing mud and sand (1310); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</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>); Twaite 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 users and relevant authorities. <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>Describe how the project will affect key species and key habitats</p>	<p>Of key concern in relation to the Millstreet WWTP is potential negative impact to the Freshwater Pearl Mussel, which acts as a keystone species for the SAC. This species requires stable cobble and gravel substrate with very little fine material below pea-sized gravel. Adult mussels are two-thirds buried and juveniles up to five to ten years old are totally buried within the substrate. The lack of fine material in the river bed allows for free water exchange between the open river and the water within the substrate. The free exchange of water means that oxygen levels within the substrate do not fall below those of the open water. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels. The clean substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. Organic particles within the substrate can exacerbate the problem by consuming oxygen during the process of decomposition. The habitat must be free of filamentous algal growth and rooted macrophyte growth. Both block the free exchange of water between the river and the substrate and may</p>

	<p>also cause night time drops in oxygen at the water-sediment interface. The open water must be of high quality with very low nutrient concentrations, in order to limit algal and macrophyte growth. Nutrient levels must be close to the reference levels for the river they inhabit. Phosphorus must never reach values that could allow for sustained, excessive filamentous algal growth. The presence of sufficient salmonid fish to carry the larval glochidial stage of the pearl mussel life cycle is essential.</p> <p>Several low-density populations of Pearl Mussel are distributed along the Upper Blackwater from Rathmore to Rathcoole. One is known from 1.5km downstream of the Finnow confluence with the Blackwater. The Tarbert Stream and Finnow River may be transmitting elevated levels of inorganic nutrients from Millstreet to the Blackwater; this may be reducing the recruitment capacity of these fragmented populations.</p> <p>An assessment of effluent sampling data suggests that the Millstreet WWTP produces a generally good quality effluent that is unlikely to affect any of the qualifying interests through direct deoxygenation of the river or accumulation of sediment. However, the plant is currently overloaded and does not feature nitrogen/phosphate removal as part of its treatment process. Increased orthophosphate concentration is a key inhibitor of Pearl Mussel reproduction.</p> <p>In relation to the other qualifying species of the Blackwater cSAC, 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. Such changes are likely to affect stocks of salmon within the river, a qualifying species that is already under pressure in the catchment. Lamprey, which also require high water quality with low levels of sediment are also likely to be similarly affected.</p> <p>Reduction or changes in overall fish stocks will have subsequent effects on predators, most notably otter, for which the site is also designated.</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>Elevated levels of suspended solids from effluent discharges pose a risk to salmon and lamprey recruitment where settlement on spawning gravels and/or redds may occur.</p> <p>As the Millstreet discharge appears generally compliant for oxygen loading and suspended solids, these negative effects are not considered likely from constant pressure; occasional shock loading may lead to temporary deoxygenation in the Tarbert Stream, but the Finnow River is predicted to have assimilative capacity for this. Good macroinvertebrate scores in the Finnow confirm this prediction. However, it is the proximity of the Millstreet WWTP to Pearl Mussel populations in the Blackwater River that is a key concern.</p>
<p>Describe how the integrity of the site (determined by structure and function and conservation objectives) is likely to be affected by the</p>	<p>The key ecological relationships that define the structure and function of the Blackwater River as part of the cSAC as a whole are likely to be impacted by potential nutrient enrichment. However, given the minor scale of the discharge, systemic disturbance is not envisaged.</p> <p>The critical matter relating to the Millstreet discharge concerns the threat</p>

<p>project or plan (e.g. loss of habitat, disturbance, disruption, chemical changes, hydrological changes etc).</p>	<p>posed to remnant Freshwater Pearl Mussel populations found in the Blackwater downstream of the Finnow confluence. EPA sampling of the Blackwater itself downstream of this point, at Keale Bridge indicates that the river displays Good overall ecological status (Q=4). Cumulative pressures along this stretch are lower when compared with further downstream; agriculture forms the main land use of the area north of Millstreet and the implementation of the Nitrates Directive has lead to a progressive reduction in eutrophying run-off here.</p> <p>The Blackwater remains an open Salmon fishery, indicating Inland Fisheries Ireland's opinion that the species remains in harvestable surplus for the catchment. The assimilative capacity of the Blackwater for nutrients is high overall, but localised deoxygenation of the water column or clogging of the waterbody with macroalgae and macrophytes may be considered a significant impact to migrating and spawning salmon. Lampreys are known to require equitable water quality standards to salmon. These species are unlikely to be affected by the Millstreet discharge, as sampling indicates that Q ratings are good downstream of the plant. However, this is not indicative of the negative influence on Pearl Mussels caused by even small increases in Orthophosphate..</p> <p>Reduction in key diet species such as salmonids may negatively affect otter populations in the catchment. Competition with the invasive non-native mink may act in combination in this regard. Again, such impacts downstream of the Millstreet discharge are considered unlikely; despite being overloaded, the effluent is overall compliant with UWWT regulations.</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>Overall, the Millstreet WWTP generates UWWT compliant effluent, despite being currently overloaded. However, only secondary treatment is currently applied. The Millstreet plant is listed under the WSIP and an upgrade to the plant is planned after 2012. This upgrade will deal with the overloaded status of the plant. A tertiary nutrient removal phase is also recommended in the plant design. Once this upgrade has been put in place, it is considered that negative pressure on Pearl Mussel in the Blackwater downstream of Millstreet will be effectively mitigated against.</p> <p>The Freshwater Pearl Mussel Sub-basin Plan makes specific reference to investigating the need for upgrade due to overloading and installing nutrient removal at the plant, owing to the proximal downstream presence of pearl mussels.</p>
<p>Conclusion</p>	<p>At present, the negative pressure upon Freshwater Pearl Mussel populations occurring in the Blackwater downstream of the Finnow River confluence due to overloading and ongoing phosphorus input to said waterbody is considered a significant impact that will continue until nutrient removal is put in place at the plant. This is in contravention of Conservation Objective Number 2 for the cSAC. Overall cumulative impacts are low, but the Pearl Mussel populations in this region are low density and are highly fragmented.</p> <p>The assessment therefore concludes that impacts to the Freshwater Pearl Mussel, a qualifying interest for the Blackwater River (Cork/Waterford) cSAC, cannot be discounted at this stage, due to potential significant negative pressure due to increased phosphorus loading from the overloaded secondary treatment-only Millstreet plant.</p>

Appendix 23 – Newmarket Screening

EPA Ref: D0333-01

Project	
Location	Discharge associated with agglomeration of Newmarket village, County Cork.
Distance from designated site	0km: WWTP discharges to the Dalua River, inside the cSAC boundary.
Brief description	<p>The town of Newmarket is situated along the River Dalua, approximately 5km from the town of Kanturk, in northwest Cork. The town has experienced minor housing developments in recent years, however local road structure and services have been improved to promote the Newmarket potential as an important local centre for the North Cork region.</p> <p>The wastewater in Newmarket is collected in a partially combined foul and separate foul sewerage drainage network. The wastewater from both the village gravitates to the wastewater treatment plant, which is located adjacent to Anne's Bridge.</p> <p>Newmarket WWTP has two distinct systems catering for the Population Equivalent (PE) of 1000. The systems employed at Newmarket WWTP are the following:</p> <ul style="list-style-type: none"> • Old Percolating Filters æ Designed for a PE of 500 • New Extended Aeration Package Plant designed for a PE of 1000 <p>The influent is initially screened at the automatic screen which was installed as part of the recent upgrade. From the automatic screen the influent proceeds to a Splitter Chamber / Sump, where the influent is divided between the new Package Plant and the old Percolating Filters. From the Sump / Splitter Chamber influent gravitates to 2 Nr Primary sedimentation Tanks and from these tank the effluent is siphoned to the 2 Nr Percolating Filters. Following percolation of the effluent through the media the influent gravitates to the 2 Nr Humus Tanks. After the Humus Tank effluent discharges via a 225mm diameter concrete outfall to the Dalua River.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening	
Describe the individual elements of the plan (either alone or in combination with other plans or projects) likely to	The Newmarket agglomeration receives tertiary treatment at the main WWTP, before discharging to the Dalua River. The effluent then disperses in the water column.

give rise to impacts on the Natura 2000 sites.

An observation of the Dalua River downstream of the WWTP revealed that at this location, the river is relatively minor in scale (2-3m wide) with slow flows and occasional riffles along a shallow incline.

The most recent EPA water quality sampling data from 2009 indicates that the Dalua River displays good (Q=4) ecological conditions downstream of the discharge point. This is marked as an improvement upon 2003 records, where only moderate water quality was recorded.

The overall ecological status of the catchment is listed by the EPA as 'Improved'. The river was identified as satisfactory throughout with Good and High ecological quality results only

Mean sampling data for the discharge provided by Cork County Council with for dates between 2006 and 2008 is as follows, in mg/l:

- BOD = 20.23
- SS = 31.94

No other data was available.

Sampling results of the Dalua River provided with the Licence Application indicate that the Dalua River display WFD 'High' Status for BOD, Ammonia and Orthophosphate, both upstream and downstream of the recently upgraded Newmarket plant.

The outfall effluent contains material and solutes which may have a eutrophying effect within the receiving stream, but it should be noted that these are likely to exist in significantly lower concentrations than if no treatment were to be applied.

Cork County Council have noted that there is a capacity shortfall for stormwater loading at the plant. As such, there is a risk of occasional untreated material bypassing the plant and discharging to the river.

Under consultation, Inland Fisheries Ireland made no reference to the Newmarket WWTP, thereby suggesting that it is operating in a satisfactory manner from a fisheries perspective.

The Water Framework Directive assigns 'Moderate' status to the Dalua River; this is based on results for Macroinvertebrate diversity from 2006, before conditions were reporting as having improved by the EPA. The upgrade of the Newmarket plant is likely to have contributed significantly to this improvement.

The Second Draft Freshwater Pearl Mussel Sub-Basin Plan does not list the Newmarket WWTP as potentially having an adverse effect on the pearl mussel. The Meelin plant, which lies 7km upstream of Newmarket, is listed as such a risk due to it operating near capacity, but is a significant distance upstream of any pearl mussel populations. The Kanturk WWTP lies 12km downstream and is reported by IFI to be causing over enrichment of the Allow with slight gross organic matter immediately below the outfall point, suggesting nutrient removal performance may need to be revised; however, the EPA report that good ecological conditions persist very closely downstream to this point, indicating very rapid biological recovery. As the Newmarket effluent is of good quality and only good and high ecological conditions are recorded between Newmarket and Kanturk, it is not predicted that these two WWTPs are acting in a cumulative manner.

The Newmarket Creameries Co-op is located in the environs of the

	<p>village. This operates under an IPPC licence and the plant operates its own internal WWTP which discharges to the Rampart River, a tributary of the Dalua. Information provided by the Creamery in its 2007 licence application indicate that the assimilative capacity of the Dalua was sufficiently high to deal with treated effluent loading from the Creamery and Newmarket village WWTP. Future upgrades of the Newmarket WWTP may consolidate these two discharges.</p> <p>A rock quarry is also located in the area, at Commons South, in the catchment of the Glentara River which flows into the Dalua upstream of the Newmarket WWTP. No evidence of siltation of the river from suspended solids generated by quarrying has been recorded.</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>EPA data for the Allow catchment indicates satisfactory conditions throughout. It is predicted that the Newmarket discharge is not acting in combination with the other WWTPs in the catchment (Meelin, Kanturk) to negatively influence water quality in the catchment. Some very localised reduction water quality has been reported by IFI around the Kanturk outfall, but EPA records very closely downstream indicate good ecological status; the Allow thus appears to have a high rate of biological recovery and a high assimilative capacity.</p> <p>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</p>

	<p>nutrient management has improved dramatically due to participation in REPS and more recently, to the Nitrates Action Programme.</p> <p>The IRD Duhallow LIFE project entitled 'Restoration of the Upper River Blackwater SAC for the Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>), Atlantic Salmon (<i>Salmo salar</i>), European Otter (<i>Lutra lutra</i>) and Kingfisher (<i>Alcedo atthis</i>)' aims to improve habitat quality in the Allow catchment. This is likely to have a beneficial effect via reducing land-based pressures on the river, and may help negate some of the enrichment pressures described above. A key deliverable is the promotion of cattle fencing along the river to prevent further siltation and pollution of the river. This will act cumulatively with the WWTPs in the region to reduce negative pressures in the Allow sub-catchment.</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; Climate change.</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 Dalua at 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 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 - Records in main Blackwater channel only exist near Fermoy. The species has also been historically recorded in the Awbeg sub-catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter.</p> <p>Elevated nutrient levels and dissolved oxygen demand can lead to recruitment failure in Freshwater Pearl Mussel populations. While adult specimens may be more tolerant to temporary deoxygenation, juveniles become stressed very easily and mortality can be high. Ongoing eutrophication leads to progressive ageing of populations and associated reduction in density. The compliant Newmarket discharge is very small in scale in relation to the overall context and watershed of the Blackwater catchment. Given that such populations are over 20km downstream, it is highly unlikely that pearl mussel populations in the main Blackwater channel are negatively influenced by the Newmarket WWTP.</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.</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 species which have also been recorded in the Allow Catchment. The Dalua has seen ecological</p>

	<p>improvement in recent years and no evidence of river substrate enrichment was observed during field surveys. Such impacts are considered unlikely.</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 overall Blackwater catchment is under threat from a variety of sources, including run-off from intensive agriculture, especially in the well known agricultural area known as the Golden Vale. Nutrient run-off, sedimentation and acidification from forestry also put pressure on the river further up its reaches, where substantial areas of the catchment are under coniferous cover. Up until recently, the level of treatment of sewage being discharged to the river Blackwater 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 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.</p> <p>The levels of organic and inorganic nutrients contained within the Newmarket discharge are notably small, and the effluent is compliant with the UWWT regulations. Water quality has been seen to improve in the Dalua since previous EPA sampling; this is likely to be indicative of a reduction in agricultural run-off to the river via the implementation of Nitrates Directive.</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>In the context of other discharges to the Dalua River and Allow catchment, the Newmarket plant generates a compliant effluent in low volumes. There is some lack of capacity for stormwater loading at the plant; on occasion, untreated material may bypass the plant and discharge directly to the river. While there is no evidence of impact from such stochastic events, Cork County Council has noted that it is aware of the issue. No Small Schemes funding is currently available to add additional stormwater capacity. However, the river is currently considered to be in good ecological condition with a further improvement in water quality from good to high recorded downstream of Newmarket.</p> <p>Other negative pressures to the qualifying interests of the cSAC may be resulting from other land uses (primarily agriculture) in the area. The Duhallow LIFE project aims to target agricultural pressures in the Allow River and thus further reduce negative cumulative pressures on the wider catchment.</p> <p>The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Newmarket discharge are envisaged and therefore no further assessment is required.</p>

Appendix 24 – Rathcormack Screening

EPA Ref: D0200-01

Project	
Location	Discharge associated with agglomeration of Rathcormack village, County Cork.
Distance from designated site	0km: WWTP discharges to the River Bride, inside the cSAC boundary.
Brief description	<p>The village of Rathcormack is located 22km north of Cork City, along the R639, formerly the N8. The village has experienced substantial construction and population growth in the last number of years.</p> <p>As a result, the previous WWTP with a design PE of 800 was substantially overloaded. A new plant was therefore constructed and commissioned in 2009.</p> <p>The new wastewater treatment plant is designed to cater for a population equivalent of 4,000 persons, which will be adequate to serve all development within the development boundary of the village. Tertiary treatment is provided on-site before the plant discharges to the River Bride.</p> <p>The WWTP is designed to generate an effluent with the following variables:</p> <ul style="list-style-type: none"> • BOD: 10.0mg/l • Suspended Solids: 15.0mg/l • COD 70.0mg/l • Phosphorus 1.0mg/l – Total P <p>The plant is currently significantly underloaded and generates a high quality effluent.</p>
Is the plan directly connected with or necessary to the Natura 2000 site management for nature conservation?	No

Stage 1 - Screening	
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>The Rathcormack agglomeration receives tertiary treatment at the WWTP, before discharging to the River Bride. The effluent then disperses in the water column.</p> <p>An observation of the River Bride downstream of the discharge revealed that at this location, the river is quite wide in scale (8-10m wide) with moderate flows over occasional riffles along a shallow incline. Frequent patches of aquatic macrophytes were observed, including Water</p>

	<p>crowfoot; no algal mats were observed. Water quality appeared in good condition.</p> <p>The most recent EPA water quality sampling data from 2009 indicates that the River Bride displays good (Q=4) ecological conditions upstream and downstream of the discharge point. This reflects an improvement on 2006 records, where Q values downstream of Rathcormack (Bealacón Footbridge) were Q=3-4.</p> <p>The overall ecological status of the River Bride is listed by the EPA as improved with good ecological conditions at all stations sampled in 2009. Other improvements relate to slightly polluted conditions near Shanbally in 2003; farmyard slurry was reaching a nearby stream at the time of the survey. Water quality is also likely to have improved downstream of Bridebridge village.</p> <p>Recent sampling data provided by Cork County Council indicates the following levels in mg/l:</p> <ul style="list-style-type: none"> • BOD = 2 • SS = 3 • COD = 27 • P = 0.51 • N = n/s <p>These are excellent values and are considered very low for the scale of the agglomeration; this reflects the present underloaded status of the WWTP. Given the large assimilative capacity of the River Bride at this location, no changes to water chemistry or trophic status are predicted.</p> <p>In relation to the water quality variables detailed in the 2009 Surface Water Regulations, sampling indicates no increases in BOD, Ammonia or Orthophosphate result from the current effluent discharge at Rathcormack. As such, the WWTP is technically not contributing to decline in water quality and is therefore compliant with the regulations.</p> <p>Under consultation, Inland Fisheries Ireland made no reference to the Rathcormack WWTP as having a negative influence on fisheries in the catchment. The recent upgrade is very beneficial from a fisheries perspective.</p> <p>The Water Framework Directive assigns 'Moderate' status to this stretch of the River Bride; this is based on historical results for aquatic macroinvertebrate diversity found in this area, which have only recently improved. The Rathcormack WWTP is listed as a pressure/risk in the River Bride WMU, owing to "Insufficient existing capacity, non-compliant effluent standard". This data is now outdated, given the recent upgrade and excellent effluent generated by the new plant. Upgrades to the Bridebridge and Castlelyons WWTPs further contribute to the reduction of nutrients entering the Bride catchment.</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> <p>Size and scale; Land-take; Distance from Natura 2000 site or key features of the site;</p>	<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>Resource requirements; Emissions; Excavation requirements; Transportation requirements; Duration of construction, operation etc.;</p> <p>Others.</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>The significantly underloaded Rathcormack plant is generating an effluent with negligible nutrient input; none of the above risks are considered likely.</p> <p>The Rathcormack WWTP lies upstream of the Bridebridge and Castlelyons WWTPs. These have also been recently upgraded and are underloaded; sampling data provided by Cork WWTP indicates that the Castlelyons plant provides a good quality effluent with no discernible impact on the Shanowennadrinna Stream; a similar situation exists for the Bridebridge plant which is to be further upgraded in the near future with additional diffusers. The cumulative influence of the upgrade of these plants in recent years is considered a significant positive impact on the Bride catchment.</p> <p>The surrounding land use is primarily agricultural pasture. 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. Reduction in slurry usage in the Bride catchment appears to have contributed to an improvement in water quality in recent years.</p> <p>The River Bride was closed to salmon and sea trout fishing in 2010, but is to be re-opened on a catch-release basis in 2011. Inland Fisheries Ireland therefore consider the Bride population to be improved from previous years, but not yet in harvestable surplus. The upgrade of the WWTPs along the Bride is likely to contribute to a recovery in salmon numbers in coming years.</p>
<p>Describe any likely changes to the site arising as a result of: Reduction of habitat area; Disturbance of key species;</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</p>

<p>Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value; Climate change.</p>	<p>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 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 • Freshwater Pearl Mussel - Records are restricted to the main Blackwater channel and the Allow catchment. • White-clawed Crayfish – Historically not recorded from the Bride catchment. <p>The remainder of the species which may be affected are thus: River Lamprey, Brook Lamprey, Atlantic salmon 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. The River Bride has seen significant improvement in water quality in recent years and such deoxygenation is not considered a risk; observed aquatic macrophytes are likely to reduce in number in the coming years as historical enrichment of the riverbed is consumed.</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. A significant degree of floating river vegetation was observed in the River Bride at Rathcormack Bridge. No gross eutrophication in the form of algal mats was observed. The presence of the current levels of vegetation may be attributed to historical phosphorus and nitrate input to the River, the effects of which will take several years to dissipate; levels of in-stream vegetation are predicted to fall over the coming years. Between the vegetation, the river substrate was observed to be open and no barriers to fish migration were recorded.</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.</p> <p>The modern Rathcormack plant is currently significantly underloaded and generating an excellent quality effluent. An overall improvement in ecological conditions has been observed in the River Bride in recent years, attributable to the upgrade of the respective WWTPs and improved agricultural practices along the river. This is likely to have a beneficial effect on the qualifying interests found within this part the catchment (Atlantic salmon, Lamprey and Otter).</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 Rathcormack plant is significantly underloaded and sampling of the effluent indicates that it is not contributing to significant nutrient input in the overall Bride River system. Ecological conditions have been seen to be improving in the river in recent years, which is likely to be indicative of a reduction in cumulative pressures.</p> <p>The downstream Castlelyons and Bridebridge plants have been recently upgraded and both generate a good quality effluent; they are not predicted to be acting in conjunction with the Rathcormack WWTP to a significant degree. The river is currently considered to be in satisfactory ecological condition with good ecological conditions recorded upstream and downstream of the discharge. Inland Fisheries Ireland have no concerns relating to the discharge. Qualifying interests which have the highest ecological sensitivity (Crayfish and Pearl Mussel) are not found in this sub-catchment.</p> <p>The screening exercise therefore concludes that no significant impacts to the Blackwater River cSAC resulting from the Rathcormack discharge are envisaged and as such no further assessment is required.</p>

Appendix 25 – Blackwater River cSAC Site Synopsis

SITE NAME: BLACKWATER RIVER (CORK/WATERFORD)

SITE CODE: 002170

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. In times of heavy rainfall the levels can fluctuate widely by more than 12 feet on the gauge at Careysville. The peaty nature of the terrain in the upper reaches and of some of the tributaries gives the water a pronounced dark colour. The site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which includes the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The extent of the Blackwater and its tributaries in this site, flows through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. Towns along, but not in the site, include Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal.

The Blackwater rises in boggy land of east Kerry, where Namurian grits and shales build the low heather-covered plateaux. Near Kanturk the plateaux enclose a basin of productive Coal Measures. On leaving the Namurian rocks the Blackwater turns eastwards along the northern slopes of the Boggeraghs before entering the narrow limestone strike vale at Mallow. The valley deepens as first the Nagles Mountains and then the Knockmealdowns impinge upon it. Interesting geological features along this stretch of the Blackwater Valley include limestone cliffs and caves near the villages and small towns of Killavullen and Ballyhooly; the Killavullen caves contain fossil material from the end of the glacial period. The associated basic soils in this area support the growth of plant communities which are rare in Cork because in general the county's rocks are acidic. At Cappoquin the river suddenly turns south and cuts through high ridges of Old Red Sandstone. The Araglin valley is predominantly underlain by sandstone, with limestone occurring in the lower reaches near Fermoy.

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.

Wet woodlands are found where river embankments, particularly on the River Bride, have broken down and where the channel edges in the steep-sided valley between Cappoquin and Youghal are subject to daily inundation. The river side of the embankments was often used for willow growing in the past (most recently at Cappoquin) so that the channel is lined by narrow woods of White and Almond-leaved Willow (*Salix alba* and *S. triandra*) with isolated Crack Willow (*S. fragilis*) and Osier (*S. viminalis*). Grey Willow (*S. cinerea*) spreads naturally into the sites and occasionally, as at Villierstown on the Blackwater and Sapperton on the Bride, forms woods with a distinctive mix of woodland and marsh plants, including Gypsywort (*Lycopus europaeus*), Guelder Rose (*Viburnum opulus*), Bittersweet (*Solanum dulcamara*) and various mosses and algae. These wet woodlands form one of the most extensive tracts of the wet woodland habitat in the country.

A small stand of Yew (*Taxus baccata*) woodland, a rare habitat in Ireland and the EU, occurs within the site. This is on a limestone ridge at Dromana, near Villierstown. While there are some patches of the wood with a canopy of Yew and some very old trees, the quality is generally poor due to the dominance of non-native and invasive species such as Sycamore, Beech and Douglas Fir (*Pseudotsuga menziesii*). However, the future prospect for this Yew wood is good as the site is proposed for restoration under a Coillte EU Life Programme. Owing to its rarity, Yew woodland is listed with priority status on Annex I of the EU Habitats Directive. Marshes and reedbeds cover most of the flat areas beside the rivers and often occur in mosaic with the wet woodland. Common Reed (*Phragmites australis*) is ubiquitous and is harvested for thatching. There is also much Marsh Marigold (*Caltha palustris*) and, at the edges of the reeds, the Greater and Lesser Pond-sedge (*Carex riparia* and *C. acutiformis*). Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Reed Canary-grass (*Phalaris arundinacea*), Meadowsweet (*Filipendula ulmaria*), Nettle (*Urtica dioica*), Purple Loosestrife (*Lythrum salicaria*), Marsh Valerian (*Valeriana officinalis*), Water Mint (*Mentha aquatica*) and Water Forget-me-not (*Myosotis scorpioides*).

At Banteer there are a number of hollows in the sediments of the floodplain where subsidence and subterranean drainage have created isolated wetlands, sunk below the level of the surrounding fields. The water rises and falls in these holes depending on the watertable and several different communities have developed on the acidic or neutral sediments. Many of the

ponds are ringed about with Grey Willows, rooted in the mineral soils but sometimes collapsed into the water. Beneath the densest stands are woodland herbs like Yellow Pimpernel (*Lysimachia nemorum*) with locally abundant Starwort (*Callitriche stagnalis*) and Marsh Ragwort (*Senecio palustris*). One of the depressions has Silver Birch (*Betula pendula*), Ash (*Fraxinus excelsior*), Crab Apple (*Malus sylvestris*) and a little Oak (*Quercus robur*) in addition to the willows.

Floating river vegetation is found along much of the freshwater stretches within the site. The species list is quite extensive and includes Pond Water-crowfoot (*Ranunculus peltatus*), Water-crowfoot (*Ranunculus* spp.), Canadian Pondweed (*Elodea canadensis*), Broad-leaved Pondweed (*Potamogeton natans*), Pondweed (*Potamogeton* spp.), Water Milfoil (*Myriophyllum* spp.), Common Club-rush (*Scirpus lacustris*), Water-starwort (*Callitriche* spp.), Lesser Water-parsnip (*Berula erecta*) particularly on the Awbeg, Water-cress (*Nasturtium officinale*), Hemlock Waterdropwort, Fine-leaved Water-dropwort (*O. aquatica*), Common Duckweed (*Lemna minor*), Yellow Water-lily (*Nuphar lutea*), Unbranched Bur-reed (*Sparganium emersum*) and the moss *Fontinalis antipyretica*.

The grassland adjacent to the rivers of the site is generally heavily improved, although liable to flooding in many places. However, fields of more species-rich wet grassland with species such as Yellow-flag (*Iris pseudacorus*), Meadow-sweet, Meadow Buttercup (*Ranunculus acris*) and rushes (*Juncus* spp.) occur occasionally. Extensive fields of wet grassland also occur at Annagh Bog on the Awbeg. These fields are dominated by tufted Hair-grass (*Deschampsia cespitosa*) and rushes. The Blackwater Valley has a number of dry woodlands; these have mostly been managed by the estates in which they occur, frequently with the introduction of Beech (*Fagus sylvatica*) and a few conifers, and sometimes of Rhododendron (*Rhododendron ponticum*) and Laurel. Oak woodland is well developed on sandstone about Ballinatray, with the acid Oak woodland community of Holly (*Ilex aquifolium*), Bilberry (*Vaccinium myrtillus*), Greater Woodrush (*Luzula sylvatica*) and Buckler Ferns (*Dryopteris affinis*, *D. aemula*) occurring in one place. Irish Spurge (*Euphorbia hyberna*) continues eastwards on acid rocks from its headquarters to the west but there are many plants of richer soils, for example Wood Violet (*Viola reichenbachiana*), Goldilocks (*Ranunculus auricomus*), Broad-leaved Helleborine (*Epipactis helleborine*) and Red Campion (*Silene dioica*). Oak woodland is also found in Rincrew, Carrigane, Glendine, Newport and Dromana. The spread of Rhododendron is locally a problem, as is over-grazing. A few limestone rocks stand over the river in places showing traces of a less acidic woodland type with Ash, False Brome (*Brachypodium sylvaticum*) and

Early-purple Orchid (*Orchis mascula*).

In the vicinity of Lismore, two deep valleys cut in Old Red Sandstone join to form the Owenashad River before flowing into the Blackwater at Lismore. These valleys retain something close to their original cover of Oak with Downy Birch (*Betula pubescens*), Holly and Hazel (*Corylus avellana*) also occurring. There has been much planting of Beech (as well as some of coniferous species) among the Oak on the shallower slopes and here both Rhododendron and Cherry Laurel (*Prunus laurocerasus*) have invaded the woodland.

The Oak wood community in the Lismore and Glenmore valleys is of the classical upland type, in which some Rowan (*Sorbus aucuparia*) and Downy Birch occur. Honeysuckle (*Lonicera periclymenum*) and Ivy (*Hedera helix*) cover many of the trees while Greater Woodrush, Bluebell (*Hyacinthoides non-scripta*), Wood Sorrel (*Oxalis acetosella*) and, locally, Bilberry dominate the ground flora. Ferns present on the site include Hard Fern (*Blechnum spicant*), Male Fern (*Dryopteris filix-mas*), Buckler Ferns (*D. dilatata*, *D. aemula*) and Lady Fern (*Athyrium filix-femina*). There are many mosses present and large species such as *Rhytidiadelphus* spp., *Polytrichum formosum*, *Mnium hornum* and *Dicranum* spp. are noticeable. The lichen flora is important and includes 'old forest' species which imply a continuity of woodland here since ancient times. Tree Lungwort (*Lobaria* spp.) is the most conspicuous and is widespread.

The Araglin valley consists predominantly of broadleaved woodland. Oak and Beech are joined by Hazel, Wild Cherry (*Prunus avium*) and Goat Willow (*Salix caprea*). The ground flora is relatively rich with Pignut (*Conopodium majus*), Wild Garlic (*Allium ursinum*), Garlic Mustard (*Alliaria petiolata*) and Wild Strawberry (*Fragaria vesca*). The presence of Ivy Broomrape (*Orobanche hederaceae*), a local species within Ireland, suggests that the woodland, along with its attendant Ivy is long established. Along the lower reaches of the Awbeg River, the valley sides are generally cloaked with mixed deciduous woodland of estate origin. The dominant species is Beech, although a range of other species are also present, e.g. Sycamore (*Acer pseudoplatanus*), Ash and Horse-chestnut (*Aesculus hippocastanum*). In places the alien invasive species, Cherry Laurel, dominates the understorey. Parts of the woodlands are more semi-natural in composition, being dominated by Ash with Hawthorn (*Crataegus monogyna*) and Spindle (*Euonymus europaea*) also present. However, the most natural areas of woodland appear to be the wet areas dominated by Alder and willows (*Salix* spp.). The ground flora of the dry woodland areas features species such as Pignut, Wood Avens (*Geum urbanum*), Ivy and Soft Shield-fern (*Polystichum setiferum*), while the ground flora of the wet woodland areas contains characteristic species such as Remote Sedge (*Carex remota*) and Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*).

In places along the upper Bride, scrubby, semi-natural deciduous woodland of Willow, Oak and Rowan occurs with abundant Great Woodrush in the ground flora. The Bunaglanna River passes down a very steep valley, flowing in a north-south direction to meet the Bride River. It flows through blanket bog to heath and then scattered woodland. The higher levels of moisture here enable a vigorous moss and fern community to flourish, along with a well-developed epiphyte community on the tree trunks and branches.

At Banteer a type of wetland occurs near the railway line which offers a complete contrast to the others. Old turf banks are colonised by Royal Fern (*Osmunda regalis*) and Eared Willow (*Salix aurita*) and between them there is a sheet of Bottle Sedge (*Carex rostrata*), Marsh Cinquefoil (*Potentilla palustris*), Bogbean (*Menyanthes trifoliata*), Marsh St. John's-wort (*Hypericum elodes*) and the mosses *Sphagnum auriculatum* and *Aulacomnium palustre*. The cover is a scraw with characteristic species like Marsh Willowherb (*Epilobium palustre*) and Marsh Orchid (*Dactylorhiza incarnata*).

The soil high up the Lismore valleys and in rocky places is poor in nutrients but it becomes richer where streams enter and also along the valley bottoms. In such sites Wood Speedwell (*Veronica montana*), Wood Anemone (*Anemone nemorosa*), Enchanter's Nightshade (*Circaea lutetiana*), Barren Strawberry (*Potentilla sterilis*) and Shield Fern occur. There is some Wild Garlic, Three-nerved Sandwort (*Moehringia trinervia*) and Early-purple Orchid (*Orchis mascula*) locally, with Opposite-leaved Golden-saxifrage, Meadowsweet and Bugle in wet places. A Hazel stand at the base of the Glenakeeffe valley shows this community well. The area has been subject to much tree felling in the recent past and re-sprouting stumps have given rise to areas of bushy Hazel, Holly, Rusty Willow (*Salix cinerea* subsp. *oleifolia*) and Downy Birch. The ground in the clearings is heathy with Heather (*Calluna vulgaris*), Slender St John's-wort (*Hypericum pulchrum*) and the occasional Broom (*Cytisus scoparius*) occurring. The estuary and the other Habitats Directive Annex I habitats within it form a large component of the site. Very extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. The main expanses occur at the southern end of the site with the best examples at Kinsalebeg in Co. Waterford and between Youghal and the main bridge north of it across the river in Co. Cork. Other areas occur along the tributaries of the Licky in east Co. Waterford and Glendine, Newport, Bride and Killahaly Rivers in Waterford west of the Blackwater and large tracts along the Tourig River in Co. Cork.

There are narrow bands of intertidal flats along the main river as far north as Camphire Island. Patches of green algae (filamentous, *Ulva* species and *Enteromorpha* sp.) occur in places, while

fucoid algae are common on the more stony flats even as high upstream as Glenassy or Coneen. The area of saltmarsh within the site is small. The best examples occur at the mouths of the tributaries and in the townlands of Foxhole and Blackbog. Those found are generally characteristic of Atlantic salt meadows. The species list at Foxhole consists of Common Saltmarsh-grass (*Puccinellia maritima*), small amounts of Greater Seaspurrey (*Spergularia media*), Glasswort (*Salicornia* sp.), Sea Arrowgrass (*Triglochin maritima*), Annual Sea-blite (*Suaeda maritima*) and Sea Purslane (*Halimione portulacoides*) - the latter a very recent coloniser - at the edges. Some Sea Aster (*Aster tripolium*) occurs, generally with Creeping Bent (*Agrostis stolonifera*). Sea Couchgrass (*Elymus pycnanthus*) and small isolated clumps of Sea Club-rush (*Scirpus maritimus*) are also seen. On the Tourig River additional saltmarsh species found include Lavender (*Limonium* spp.), Sea Thrift (*Armeria maritima*), Red Fescue (*Festuca rubra*), Common Scurvy-grass (*Cochlearia officinalis*) and Sea Plantain (*Plantago maritima*). Oraches (*Atriplex* spp.) are found on channel edges. The shingle spit at Ferrypoint supports a good example of perennial vegetation of stony banks. The spit is composed of small stones and cobbles and has a well developed and diverse flora. At the lowest part, Sea Beet (*Beta vulgaris*), Curled Dock (*Rumex crispus*) and Yellow-horned Poppy (*Glaucium flavum*) occur with at a slightly higher level Sea Mayweed (*Tripleurospermum maritimum*), Cleavers (*Galium aparine*), Rock Samphire (*Crithmum maritimum*), Sandwort (*Honkenya peploides*), Spear-leaved Orache (*Atriplex prostrata*) and Babington's Orache (*A. glabriuscula*). Other species present include Sea Rocket (*Cakile maritima*), Herb Robert (*Geranium robertianum*), Red Fescue (*Festuca rubra*) and Kidney Vetch (*Anthyllis vulneraria*). The top of the spit is more vegetated and includes lichens and bryophytes (including *Tortula ruraliformis* and *Rhytidiadelphus squarrosus*).

The site supports several Red Data Book plant species, i.e. Starved Wood Sedge (*Carex depauperata*), Killarney Fern (*Trichomanes speciosum*), Pennyroyal (*Mentha pulegium*), Bird's-nest Orchid (*Neottia nidus-avis*), Golden Dock (*Rumex maritimus*) and Bird Cherry (*Prunus padus*). The first three of these are also protected under the Flora (Protection) Order 1999. The following plants, relatively rare nationally, are also found within the site: Toothwort (*Lathraea squamaria*) associated with woodlands on the Awbeg and Blackwater; Summer Snowflake (*Leucojum aestivum*) and Flowering Rush (*Butomus umbellatus*) on the Blackwater; Common Calamint (*Calamintha ascendens*), Red Campion (*Silene dioica*), Sand Leek (*Allium scorodoprasum*) and Wood Club-rush (*Scirpus sylvaticus*) on the Awbeg.

The site is also important for the presence of several Habitats Directive Annex II animal species, including Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*L. fluviatilis*), Twaite Shad (*Alosa fallax fallax*), Freshwater Pearl-mussel (*Margaritifera*

margaritifera), Otter (*Lutra lutra*) and Salmon (*Salmo salar*). The Awbeg supports a population of White-clawed Crayfish (*Austropotamobius pallipes*). This threatened species has been recorded from a number of locations and its remains are also frequently found in Otter spraints, particularly in the lower reaches of the river. The freshwater stretches of the Blackwater and Bride Rivers are designated salmonid rivers.

The Blackwater is noted for its enormous run of salmon over the years. The river is characterised by mighty pools, lovely streams, glides and generally, a good push of water coming through except in very low water. Spring salmon fishing can be carried out as far upstream as Fermoy and is very highly regarded especially at Careysville. The Bride, main Blackwater upstream of Fermoy and some of the tributaries are more associated with grilse fishing.

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. The bat species Natterer's Bat, Daubenton's Bat, Whiskered Bat, Brown Long-eared Bat and Pipistrelle, are to be seen feeding along the river, roosting under the old bridges and in old buildings.

Common Frog, a Red Data Book species that is also legally protected (Wildlife Act, 1976), occurs throughout the site. The rare bush cricket, *Metrioptera rosellii* (Orthoptera: Tettigoniidae), has been recorded in the reed/willow vegetation of the river embankment on the Lower Blackwater River. The Swan Mussel (*Anodonta cygnea*), a scarce species nationally, occurs at a few sites along the freshwater stretches of the Blackwater.

Several bird species listed on Annex I of the E.U. Birds Directive are found on the site. Some use it as a staging area, others are vagrants, while others use it more regularly. Internationally important numbers of Whooper Swan (average peak 174, 1994/95- 95/96) and nationally important numbers Bewick's Swan (average peak 35, 1994/95- 95/96) use the Blackwater Callows. Golden Plover occur in regionally important numbers on the Blackwater Estuary (average peak 885, 1984/85-86/87) and on the River Bride (absolute max. 2141, 1994/95). Staging Terns visit the site annually (Sandwich Tern (>300) and Arctic/Common Tern (>200), average peak 1974-1994).

The site also supports populations of the following: Red Throated Diver, Great Northern Diver, Barnacle Goose, Ruff, Wood Sandpiper and Greenland White-fronted Goose. Three breeding territories for Peregrine Falcon are known along the Blackwater Valley. This, the Awbeg and the Bride River are also thought to support at least 30 pairs of Kingfisher. Little Egret now breed at

the site (12 pairs in 1997, 19 pairs in 1998) and this represents about 90% of the breeding population in Ireland. The site holds important numbers of wintering waterfowl. Both the Blackwater Callows and the Blackwater Estuary Special Protection Areas (SPAs) hold internationally important numbers of Black-tailed Godwit (average peak 847, 1994/95- 95/96 on the callows, average peak 845, 1974/75-93/94 in the estuary). The Blackwater Callows also hold Wigeon (average peak 2752), Teal (average peak 1316), Mallard (average peak 427), Shoveler (average peak 28), Lapwing (average peak 880), Curlew (average peak 416) and Black-headed Gull (average peak 396) (counts from 1994/95-95/96). Numbers of birds using the Blackwater Estuary, given as the mean of the highest monthly maxima over 20 years (1974-94), are Shelduck (137 +10 breeding pairs), Wigeon (780), Teal (280), Mallard (320 + 10 breeding pairs), Goldeneye (11- 97), Oystercatcher (340), Ringed Plover (50 + 4 breeding pairs), Grey Plover (36), Lapwing (1680), Knot (150), Dunlin (2293), Snipe (272), Black-tailed Godwit (845), Bar-tailed Godwit (130), Curlew (920), Redshank (340), Turnstone (130), Blackheaded Gull (4000) and Lesser Black-backed Gull (172). The greatest numbers (75%) of the wintering waterfowl of the estuary are located in the Kinsalebeg area on the east of the estuary in Co. Waterford. The remainder are concentrated along the Tourig Estuary on the Co. Cork side.

The river and river margins also support many Heron, non-breeding Cormorant and Mute Swan (average peak 53, 1994/95-95/96 in the Blackwater Callows). Heron occurs all along the Bride and Blackwater Rivers - 2 or 3 pairs at Dromana Rock; c. 25 pairs in the woodland opposite; 8 pairs at Ardsallagh Wood and c. 20 pairs at Rincrew Wood have been recorded. Some of these are quite large and significant heronries. Significant numbers of Cormorant are found north of the bridge at Youghal and there are some important roosts present at Ardsallagh Wood, downstream of Strancally Castle and at the mouth of the Newport River. Of note are the high numbers of wintering Pochard (e.g. 275 individuals in 1997) found at Ballyhay quarry on the Awbeg, the best site for Pochard in County Cork. Other important species found within the site include Long-eared Owl, which occurs all along the Blackwater River, and Barn Owl, a Red Data Book species, which is found in some old buildings and in Castlehyde west of Fermoy. Reed Warbler, a scarce breeding species in Ireland, was found for the first time in the site in 1998 at two locations. It is not known whether or not this species breeds on the site, although it is known to nearby to the south of Youghal. Dipper occurs on the rivers.

Landuse at the site is mainly centred on agricultural activities. The banks of much of the site and the callows, which extend almost from Fermoy to Cappoquin, are dominated by improved grasslands which are drained and heavily fertilised. These areas are grazed and used for silage

production. Slurry is spread over much of this area. Arable crops are grown. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the populations of Habitats Directive Annex II animal species within it. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the Blackwater and its tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. Other recreational activities such as boating, golfing and walking are also popular. Water skiing is carried out at Villierstown. Parts of Doneraile Park and Anne's Grove are included in the site: both areas are primarily managed for amenity purposes. There is some hunting of game birds and Mink within the site. Ballyhay quarry is still actively quarried for sand and gravel. Several industrial developments, which discharge into the river, border the site.

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 nonnative species, for example Cherry Laurel.

Overall, 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.

13.09.2006

Appendix 26 – Consultation Responses

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Geoff Hamilton
Senior Ecologist
Ryan Hanley Consulting Engineers.
Sherwood House
Sherwood Avenue
Tailors' Hill
Galway

April 7th, 2011,

RE: River Blackwater WWTP discharge Appropriate Assessments.

Dear Mr Hamilton,

I refer to your letter concerning the preparation of an Appropriate Assessment for Waste Water Treatment plants on the River Blackwater catchment.

Whilst there have been a number of upgrades on Cork County Council WWTPs on the catchment in recent years a number of plants are still operating where p.e. loading is near or above the plants design capacity as detailed by council information regarding the same.

Upgrades of treatment plants at sites where urban development had previously overwhelmed existing treatment capacity eg. Buttevant and Rathcormac, have shown visible improvements on discharge quality and river bed condition at discharge points. Other WWTPs treating agglomerations of varying size with their current loading at or near capacity do show signs to varying degrees of unsatisfactory discharges in the form of gross organic matter developing at and downstream of discharge points.

Glenville WWTP would be exemplar of a smaller treatment plant where such unsatisfactory conditions exist likely due to the plant being overburdened by p.e. loading, resulting in gross matter present in the receiving stream in the environs of the discharge point and downstream of the same, requiring an upgrade in treatment capacity in order to improve the situation.

Kanturk WWTP would be exemplar of a plant treating a more substantial agglomeration and operating at close to its population equivalent design loading, where the riverbed downstream is showing over enrichment with slight gross organic matter immediately below the outfall point, suggesting nutrient removal performance may need to be revised.

Mallow WWTP one of two plants treating over 10,000 p.e. in the catchment has been the subject of a number of reports to our office over recent years from members of the general public regarding visibly unsatisfactory discharges from its outfall, with most of these incidents being attributed to breakdowns/faults following our investigation and communication with council staff. While it would be worthy of an appropriate assessment to ascertain the current p.e. loading and treatment capacity of all plants in the listing attached in your communication, I would suggest in light of the above and also the level of development in Mallow over recent years with subsequent increase in BOD loading associated with the same, that this issue should be clarified in particular with respect to Mallow. This bearing in mind the cumulative effect on the catchment from such a large plant if not operating in optimal conditions ie the daily BOD loading on Mallow would weigh heavily against all other agglomerations on your list combined (excluding that of Fermoy).

From Cork County Council communications received as recently as mid 2009 from tabular information provided the following plants were operating near to or above their population equivalent design at that time; Ballyhea, Boherbue, Dernagree, Dromahane, Kanturk, Kiskeam, Knocknagree, Lombardstown, Meelin, Millstreet, and Rathcoole and therefore should require further investigation as regards possible capacity upgrade and or nutrient removal facility. I have no information on upgrades at any of the above listed plants in the meantime.

Yours sincerely

Andrew Gillespie
Fisheries Environmental Officer.

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Response to Letter from Ryan Hanley Consulting Engineers to Teagasc

Agricultural Pressures on the Blackwater Catchment

Thank you for the opportunity to comments on the potential agricultural pressures on the catchment. As you will be aware 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.

1. 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.
2. 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.
3. Similar improvements have occurred in the usage of organic manures
4. 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.
5. 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.

The Agricultural Catchments Programme is being run by Teagasc on behalf of DAFF. This programme is examining in detail the extent of nutrient loss to water courses from agriculture. Initial reports from this programme will be available late in 2011. A number of the catchments are of particular relevance to the Blackwater catchment.. Drimoleague, an intensive dairy area, has many characteristics similar to significant portions of the Blackwater catchment while the catchments in Castledockerel (Co Wexford) and Dunleer (Co Louth) have significant tillage components in the enterprise mix. These studies will add significantly to the knowledge base of the pressures on catchments from agricultural sources.

It is hoped that the improvements emanating from the agricultural sector will continue to have a positive impact in the catchment and that they will be mirrored by improvements from industry, municipal and rural housing sources to deliver improved water quality in the Blackwater and other river catchment areas.

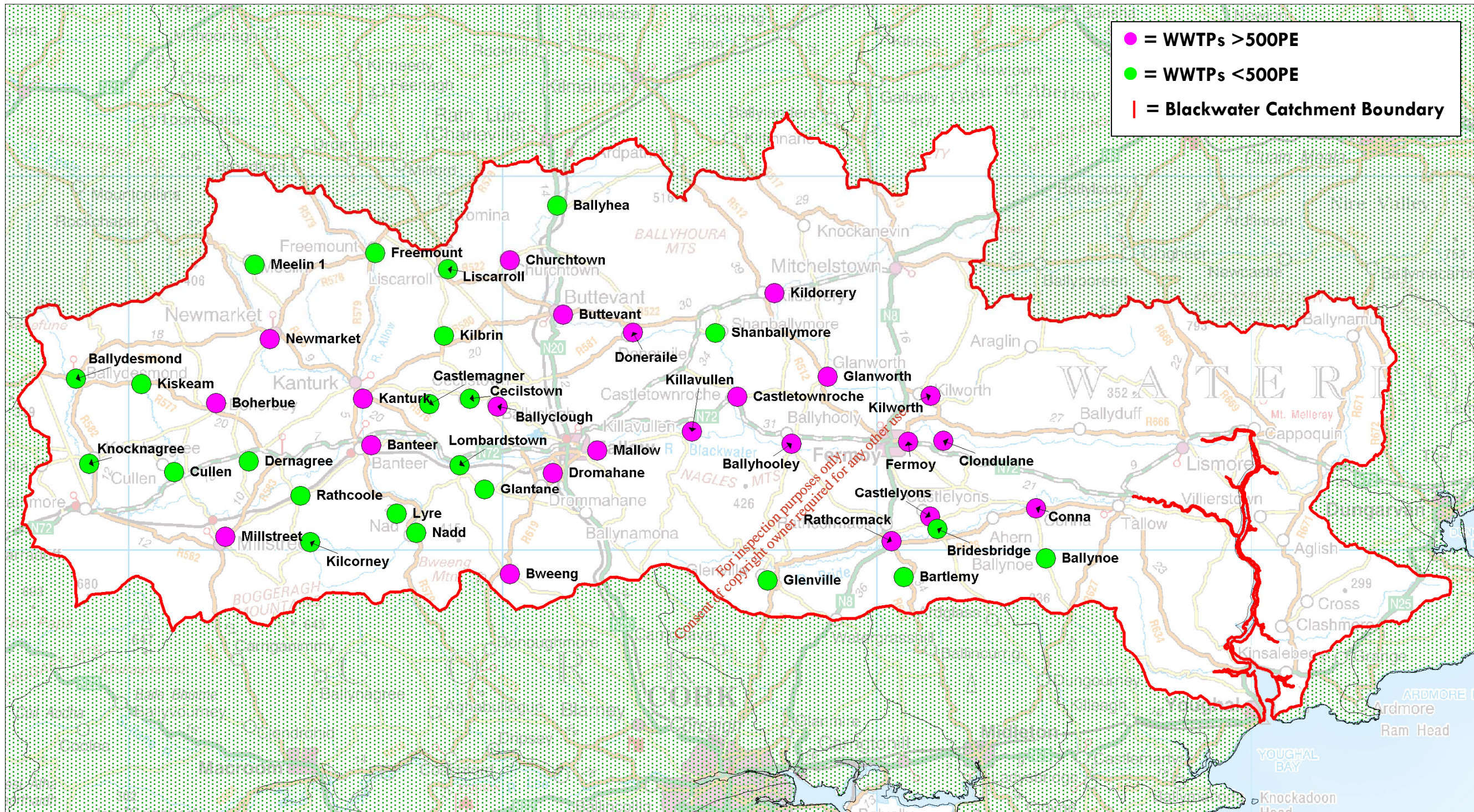
I am not aware of any specific discharges that are problematic.

Patrick Murphy

Head of Environment Knowledge Transfer

Appendix 27 – Maps

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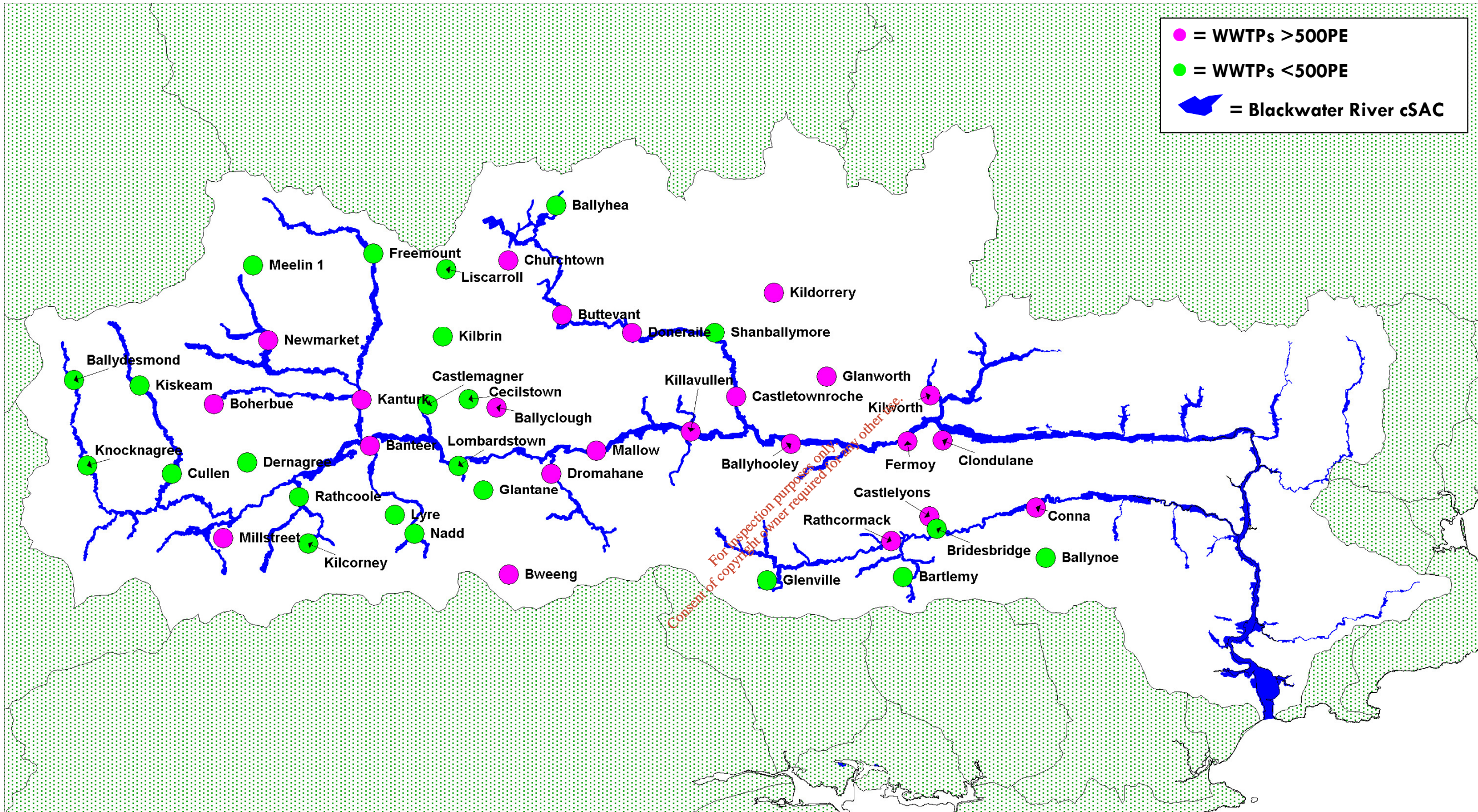
- = WWTPs >500PE
- = WWTPs <500PE
- | = Blackwater Catchment Boundary



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Geographic locations of Blackwater River WWTPs



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Extent of Blackwater River cSAC