Comhairle Contae
Chill Dara
Kildare
County Council

Water Services Section
Tel: 045-980320
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Date 4th November 2010

Ms Kate Stafford
Inspector,
c/o Administration,
Office of Climate, Licensing & Resource Use,
Environmental Protection Agency,
Headquarters,
PO Box 3000,
Johnstown Castle Estate,
County Wexford.

RE:- Kildare County Council
Wastewater Discharge (Authorisation) Regulations, 2007
Reply to Regulation 25(c)(ii) Notice Issued on 7th April 2010
Application Register No. AO 113-01 Nurney

Dear Ms. Stafford,

I refer to the Agency's letter dated 07/04/2010 in relation to the above application submitted 21/12/2009 and reply as follows to the further information request;

We submit the attached Screening Report for Nurney as prepared for the Council by Golder Associates Ireland. The Screening Report is the response to the request for further information. With regard to the recommendations in the Screening Report we await the Agency's comments and recommendations.

We trust that this information answers the queries to your satisfaction and we await your decision in due course.

In the meantime, should you have any further queries, please contact the undersigned.

Yours sincerely,

Gerry Halton

G. Halton,
Senior Executive Officer.

10 October 2010

CELEBRATING 50 YEARS in 2010

Appropriate Assessment Screening Nurney WWTP

Submitted to:
Paul Hickey
Water Services Section
Kildare County Council
Aras Chill Dara
Devoy Park
Naas
Co.Kildare

REPORT

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1.0 INTRODUCTION

1.1 Terms of Reference

This report is an Appropriate Assessment Screening of the waste water discharges from Nurney WWTP, Co.Kildare, in accordance with the requirements of the EU Habitats Directive (Directive 92/43/EEC).

Articles 6(3) and 6(4) of this Directive state the following:

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.*

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 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.

1.2 Methods

This report has been prepared with reference to the following documents:

- 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 Communities, 2002);
- Managing Natura 2000 sites: the provisions of Article of the 'Habitats Directive' 92/43/EC;
- Circular L8/08 'Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments' Department of Environment, Heritage and Local Government, 2008; and
- Notes on Appropriate Assessment for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. 684 of 2007) Environmental Protection Agency (www.epa.ie).

Appropriate Assessment is carried out in stages, as recommended by the Guidance Documents. There are four stages as follows:

1.2.1 Stage 1: Screening

This initial stage aims to identify the likely impacts of the project on a Natura 2000 site, either alone or in combination with other projects or plans. The impacts are examined to establish whether these impacts are likely to be significant. Assessment of the significance of effects is carried out in consultation with the relevant nature agencies. The following flow diagram from Circular L8/08 referred to above and shown in Fig 1 below will be completed as part of the screening process.

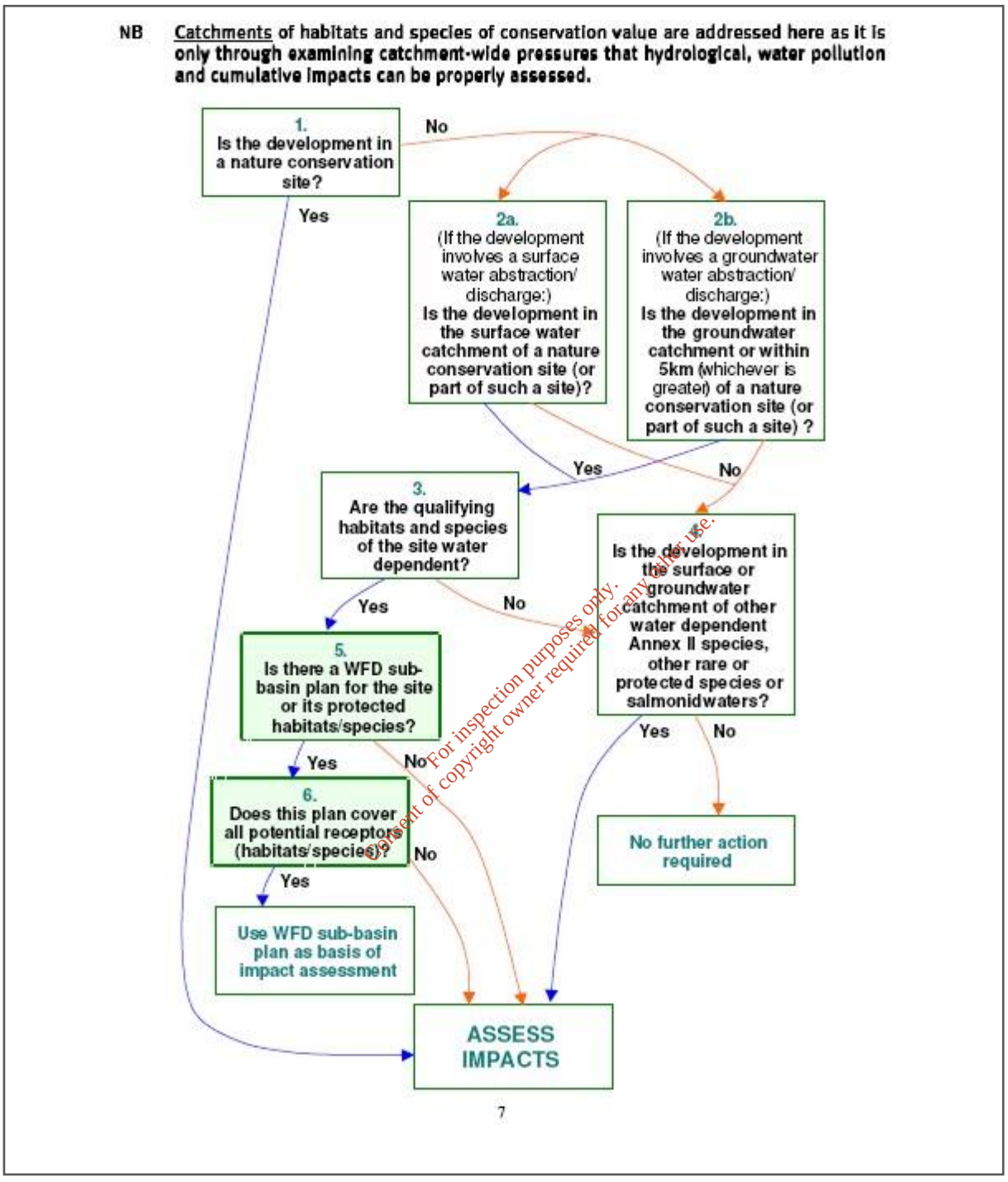

Figure 1 Screening Flow Chart (DOE, 2008)

The remaining 3 stages of the AA process do not form part of this project but are outlined briefly below.

1.2.2 Stage 2: Appropriate Assessment

The aim of this stage is to identify the conservation objectives of the site and to assess whether or not the project, either alone or in combination with other projects or plans will result in adverse effects on the integrity of the site, as defined by the conservation objectives and status of the site. Stage 2 is carried out in consultation with the relevant nature agencies.

Where it cannot be demonstrated that there will be no adverse effects on the site, it is necessary to devise mitigation measures to avoid, where possible, any adverse effects.

1.2.3 Stage 3: Assessment of alternative solutions

This stage examines alternative ways of implementing the project that, where possible, avoid any adverse impacts on the integrity of the Natura 2000 site. If alternative solutions have been identified that will either avoid any adverse impacts or result in less severe impacts on the site, it will be necessary to assess their potential impact by recommencing the assessment at Stage One or Stage Two as appropriate. However, if it can be reasonably and objectively concluded that there is an absence of alternatives, it will be necessary to proceed to Stage Four of this assessment methodology.

1.2.4 Stage 4: Assessment where adverse impacts remain

For sites that host priority habitats and species, it is necessary to consider whether or not there are human health or safety considerations or environmental benefits flowing from the project. If such considerations do exist, then it will be necessary to carry out the Stage Four assessments of compensatory measures. If no such considerations exist, then establish whether there are other imperative reasons of overriding public interest (IROPI) before carrying out the Stage Four assessments. Where IROPI exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the site will be necessary before the project or plan can proceed.

2.0 SCREENING

This section follows the screening flow chart presented in Figure 1.

Q1. Is the development in a nature conservation site?

No

Q2. Is the development in the surface water catchment of a nature conservation site (or part of such a site)?

Yes, Nurney WWTP discharges into the Tully Stream, a tributary of the River Barrow SAC. The Tully Stream joins the Finnery River ca 4 km further south, the Finnery River forms part of the River Barrow SAC.

Q3. If yes, are the qualifying habitats and species of the site water dependent?

Yes, qualifying species in this section of the River Barrow may include; Freshwater Crayfish *(Austropotamobius pallipes),* Salmon *(Salmo salar),* Brook *(Lampetra planeri)* and River Lamprey *(Lampetra fluviatilis)* and the marsh snail (*Vertigo moulinsiana)*. It may also include mammal species such as Annex IV species Otter (*Lutra lutra*) and Annex I bird species Kingfisher that rely on the river for prey items such as fish. Annex I habitats instream may include - Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Calitricho-Batrachion*.

As the discharge occurs upstream of the River Barrow SAC and may potentially impact on aquatic habitats and species listed above, an Appropriate Assessment Stage 1 Screening follows as outlined in the *Methodological guidance on the provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC* (European Communities, 2002). There is no sub basin plan available for this site at the time of this screening.

Special Protection Areas
Proposed Natural Heritage Areas
Natural Heritage Areas
Special Areas of Conservation
Grid 10K

Figure 2 NPWS Designations

2.1 Appropriate Assessment Screening: Stage 1

2.1.1 Brief description of Natura 2000 site

River Barrow and River Nore SAC

The site is a candidate SAC selected for alluvial wet woodlands and petrifying springs, priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for old oak woodlands, floating river vegetation, estuary, tidal mudflats, Salicornia mudflats, Atlantic salt meadows, Mediterranean salt meadows, dry heath and eutrophic tall herbs, 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, Nore Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon, Otter, Vertigo moulinsiana and the plant Killarney Fern.

Good examples of Alluvial Forest are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site.

A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland and one listed with priority status on Annex I of the EU Habitats Directive. These hard water springs are characterised by lime encrustations, often associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Cratoneuron commutatum* var. *commutatum* and *Eucladium verticillatum*, have been recorded.

The best examples of old Oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site.

The site is very important for the presence of a number of EU Habitats Directive Annex II animal species including Freshwater Pearl Mussel *(Margaritifera margaritifera* and *M. m. durrovensis),* Freshwater Crayfish *(Austropotamobius pallipes),* Salmon *(Salmo salar),* Twaite Shad *(Alosa fallax fallax),* three Lamprey species - Sea *(Petromyzon marinus),* Brook *(Lampetra planeri)* and River *(Lampetra fluviatilis),* the marsh snail *Vertigo moulinsiana* and Otter *(Lutra lutra).* This is the only site in the world for the hard water form of the Pearl Mussel *M. m. durrovensis* and one of only a handful of spawning grounds in the country for Twaite Shad. The freshwater stretches of the River Nore main channel is a designated salmonid river. The Barrow/Nore is mainly a grilse fishery though spring salmon fishing is good in the vicinity of Thomastown and Inistioge on the Nore. The upper stretches of the Barrow and Nore, particularly the Owenass River, are very important for spawning.

The site supports many other important animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat *(Myotis daubentoni),* Badger *(Meles meles),* Irish Hare *(Lepus timidus hibernicus)* and Frog *(Rana temporaria).* The rare Red Data Book fish species Smelt *(Osmerus eperlanus)* occurs in estuarine stretches of the site. In addition to the Freshwater Pearl Mussel, the site also supports two other freshwater Mussel species, *Anodonta anatina* and *A. cygnea.*

The site is of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by Swallows before they leave the country.

The site synopsis for the River Barrow and River Nore SAC (site code: 002162) is given in Appendix A**.**

2.1.2 Brief description of project

The existing Nurney WWTP is situated in Nurney, a small village approximately 8 km south of Kildare Town in County Kildare. The Nurney WWTP is an extended activated sludge treatment system. It was commissioned in 2002 and designed to have a capacity of 500 PE (Population Equivalent). This capacity is achieved using two FS26 BioPac Package Plants by FM Systems Ltd., each with a capacity of 250PE. Nurney WWTP receives domestic sewage only.

The plant is currently serving 330PE and should be operating within its capacity.

2.1.3 Assessment criteria

Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000:

The effluent discharge from Nurney WWTP likely to give rise to impacts on River Barrow SAC include effects on water quality.

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	Nurney WWTP is an extended activated sludge treatment system. It was commissioned in 2002 and designed to have a capacity of 500 PE (Population Equivalent). The plant is currently serving 330PE and should be operating within its capacity.
Land-take	SAC: None
Distance from Natura 2000 site or key features of the site	Within the surface water catchment of the Tully Stream and is ca 4 km upstream of the River Barrow SAC.
Resource requirements (water abstraction etc.)	None
Emissions (disposal to land, water or air)	Possible impact of the effluent discharge on surface water quality and on water dependent species for which the River Barrow is designated. With regard to the receiving surface water, the status of the Tully Stream, which is linked to the River Barrow SAC, has been assessed as *Poor* (www.epa.ie), this would indicate that the discharge has the potential to adversely affect the water quality of the River Barrow SAC which occurs downstream.
Excavation requirements	None
Transportation requirements	None
Duration of construction, operation, decommissioning etc.	Currently operating.
Other	None

Describe any likely changes to the site arising as a result of:

Reduction of habitat area	Possible effects on the area of habitats such as, Floating River vegetations - Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Calitricho-Batrachion*.
Disturbance to key species	Changes in surface water quality of the Tully Stream can affect quality of the surface water system of the SAC that lies downstream and may directly affect the species of the SAC that occur in the area and that are sensitive to such changes. Such species may include Freshwater Crayfish *(Austropotamobius pallipes)*, Salmon *(Salmo salar),* Brook *(Lampetra planeri)* and River Lamprey *(Lampetra fluviatilis)* and the marsh snail *Vertigo moulinsiana*. It may also affect terrestrial species such as Annex IV species Otter and Annex I bird species Kingfisher that rely on the river for prey items such as fish.
Habitat or species fragmentation	None
Reduction in species density	Reduction in species density is possible especially for water dependent species of the SAC including Salmon *(Salmo salar),* Brook *(Lampetra planeri)* and River *(Lampetra fluviatilis)* and the marsh snail *Vertigo moulinsiana* as well as Otter (*Lutra lutra*) and Kingfisher due to changes in water quality.
Changes in key indicators of conservation value (water quality etc.)	Possible small changes in the nutrient status of the water quality.
Climate change	None likely

Describe any likely impacts on the Natura 2000 site as a whole in terms of:

Interference with the key relationships that define the structure of the site:	The effects of the possible addition of nutrients from effluent discharge to the surface water may affect the water quality of the River Barrow SAC and associated instream habitats and adjacent habitats such as wetlands.
Interference with key relationships that define the function of the site	Changes to the water quality of the River Barrow may affect the water dependent species associated with it. This may include mammal and bird species that forage in the river.

Provide indicators of significance as a result of the identification of effects set out above in terms of:

Loss (Estimated percentage of lost area of habitat)	None
Fragmentation	None

Disruption & disturbance	Estimated degree of loss of species: Monitoring of populations of water dependent species of the River Barrow SAC. Information from fisheries and NPWS.
Change to key elements of the site (e.g. water quality etc.)	Estimated degree of risk of pollution to surface waters linked to the SAC.

2.1.4 Cumulative Impacts

Cumulative impacts arising from surface water discharges from Nurney along with other surface water discharges in the area may potentially significantly impact on the River Barrow SAC. This is indicated by the *Bad* status Tully Stream in this part of Kildare. A point discharge, Kildare Chilling Company, upstream of Nurney is indicated on the EPA Water Quality maps and other non point discharges are likely to occur in the area.

2.1.5 Water Quality

Assimilative Capacity

The assimilative capacity of the receiving waters is calculated for certain chemical parameters in order to identify the potential effects that the discharge from Nurney WWTP has on the water quality of the Tully Stream.

The Waste Assimilative Capacity (WAC) is the capacity of the receiving waters to accept discharge of final effluent. The capacity for waste assimilation provides the link between existing water quality standards and effluent discharge limits and thereby determines the level of treatment required before a discharge can be allowed into the receiving waters.

The assimilative capacity of receiving waters is calculated to determine if the stream or river can take the waste water discharge and still comply with the relevant legislation and water quality objectives. The most recent legislation in relation to surface waters is the Surface Water Regulations, 2009. The environmental quality standards specified for surface waters in the Surface Water Regulations, 2009 and the Salmonid Regulations, 1988.

The Assimilative Capacity calculations submitted by Kildare County Council to the EPA for Nurney WWTP are given in Appendix B. These indicate that there is insufficient capacity in the river to assimilate BOD, Orthophosphate and Ammonia. The downstream concentration of BOD, Orthophosphate and Ammonia are compared to the Environmental Quality Standards (EQS) in the 2009 Regulations as shown in Table 1. For the purposes of these calculations the 95%ile concentration of each parameter were used. The 95%ile was calculated using results of monitoring carried out by Water Services. The estimate of the 95 percentile flow in the receiving water was obtained from the E.P.A.'s Hydrometric Section.

Table 1:Comparison of downstream concentrations and EQS[1] (Source: KCC)

Parameter (mg/l)	Nurney WWTP	EQS
BOD	7.7	**2.6**
Orthophosphate	0.116	**0.075**
Total Ammonia	1.79	**0.14**

[1] European Communities Environmental Objectives (Surface Waters) Regulations 2009

The status of the Tully Stream is currently rated as *Poor* upstream and downstream of Nurney WWTP as shown in Table 2 and Figure 3. The Assimilative Capacity calculations submitted by Kildare County Council to the EPA for Nurney WWTP indicate that there is insufficient capacity in the Tully Stream to assimilate BOD, Orthophosphate and Ammonia. The background concentrations of BOD, Orthophosphate and Ammonia in the Tully Stream are high and exceed the EQS standards as expected given the *Poor* status of the stream.

Table 2: EPA Surface Water Quality data

River	EPA Code	Location	Water Quality	Status Description
Tully Upstream	14T020390	Soomeragh Br	3	Poor
Barrow Upstream	14B011300	Br W of Cherrymills House	3	Poor

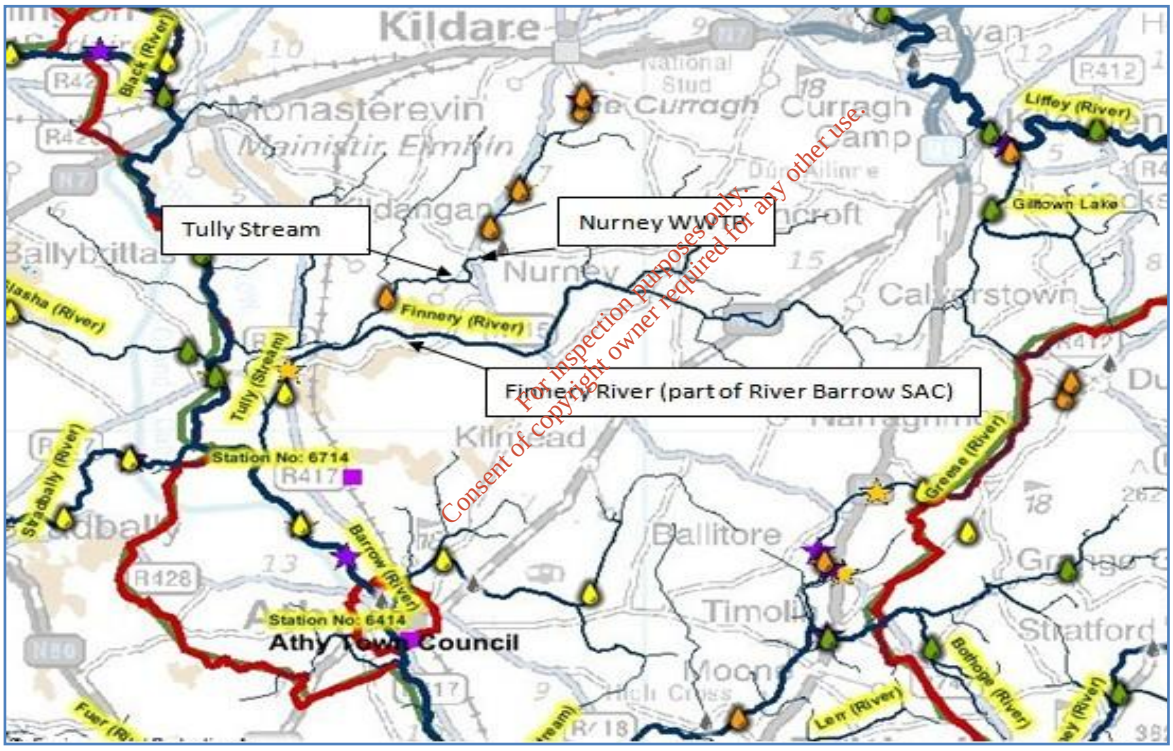

Figure 3 EPA Water Quality Information

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 or magnitude of impacts is unknown

The assimilative capacity results indicate that the Tully Stream cannot assimilate BOD, Ammonia and Orthophosphate from Nurney WWTP. Kildare County Council state that the resultant concentrations of BOD, Ammonia and Orthophosphate were increased by 0mg/l BOD, 0.03 mg/l NH_3 and 0.005 mg/l OrthoP. In particular, the Ammonia levels increased, by 20% relative to the EQS of 0.14mg/l NH_3. Therefore, Nurney WWTP, in combination with other discharges, may potentially impact on the Tully Stream and the River Barrow SAC.

3.0 FURTHER ACTION

Item 7 of Figure 1.

It is necessary to proceed to Stage 2 of the AA process.

4.0 DATA COLLECTION

The assessment was carried out by:

- Senior Ecologist – Anne Murray, Golder Associates Ireland.

Sources of Data:

- Existing information from NPWS;
- EPA Waste Water Discharge Application files; and
- WFD Reports.

Level of assessment completed:

- Desktop study and Screening report.

5.0 CONSULTATIONS

Table 3: Consultations

Name	Date	Organisation	Contact details	Response
Karen Creed	15/06/10 18/06/10	EPA	Phone calls and email	Response on 01/07/10. The EPA suggested the use of Q values for areas where data is lacking in relation to assimilative capacity.
D McInerney	16/06/10 07/07/10	SRFB	Email via Brian Beckett Phone call	Response See Table 4
Ciara Flynn	16/06/10	NPWS District Conservation Officer, Kildare	Phone call	
Aine O'Conor	17/06/10 21/06/10	NPWS HQ Freshwater Biologist	Phone calls	NPWS suggested that the Q values for each receiving waters would be most useful in determining significant impacts where information for Assimilative capacity calculations are not available
Naomi Kingston	18/10/10	NPWS HQ	Phone calls and email.	Data files received 23/06/10

Table 4: SERBD Response

Agglomeration	Receiving water	River / stream	*Atlantic salmon	*Brown trout	**Other Annex II species
Ballitore	Yes	Greese	Yes	Yes	Yes
Calverstown	No	Finnery	Yes	Yes	Yes
Kildangan 01	Yes	Derryoughter /Tully stream		Yes*	Yes*
Kildangan 02	Yes	Derryoughter /Tully stream		Yes*	Yes*
Kilkea	Yes	Greese	Yes	Yes	Yes
Kilmead	No	Trib of clogorrow bog stream	No	Yes	?
Nurney	Yes	Tully	Yes***	Yes***	Yes***
Milltown (Fenview)	Yes	Pollardstown fen stream	Yes	Yes	Yes
Castleroe West	No	Greese	Yes	Yes	Yes
Kilberry	No	Barrow	Yes	Yes	Yes
Ticknevin	Yes	Cushaling	Yes***	Yes***	Yes***
Timolin	No	Botkoge	Yes	Yes	Yes

* These columns denote possibility of Atlantic salmon and Brown trout in the relevant surface water systems at the listed locations. A number of these locations may not currently support these species due to poor water quality but would likely support such species if water quality improved e.g. Tully at Nurney

** This column denotes the likelihood of other Annex II species (freshwater crayfish, lamprey species) that we would be anecdotally aware of in the systems

*** A number of these locations may not currently support these species due to poor water quality but would likely support such species if water quality improved e.g. Tully at Nurney, Cushaling at Ticknevin

NB The exact location of the outfalls from the treatment systems is not necessarily known and therefore the nearest stream/river is assumed to receive the discharges

Report Signature Page

GOLDER ASSOCIATES IRELAND LIMITED

Anne Murray
Senior Ecologist

Conor Wall
Principal

AM/CW/am

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APPENDIX A

NPWS Site Synopsis

SITE SYNOPSIS

SITE NAME: RIVER BARROW AND RIVER NORE

SITE CODE: 002162

This site consists of the freshwater stretches of the Barrow/Nore River catchments as far upstream as the Slieve Bloom Mountains and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Major towns along the edge of the site include Mountmellick, Portarlington, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore. Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains before passing through a band of Carboniferous shales and sandstones. The Nore, for a large part of its course, traverses limestone plains and then Old Red Sandstone for a short stretch below Thomastown. Before joining the Barrow it runs over intrusive rocks poor in silica. The upper reaches of the Barrow also runs through limestone. The middle reaches and many of the eastern tributaries, sourced in the Blackstairs Mountains, run through Leinster Granite. The southern end, like the Nore runs over intrusive rocks poor in silica. Waterford Harbour is a deep valley excavated by glacial floodwaters when the sea level was lower than today. The coast shelves quite rapidly along much of the shore.

The site is a candidate SAC selected for alluvial wet woodlands and petrifying springs, priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for old oak woodlands, floating river vegetation, estuary, tidal mudflats, *Salicornia* mudflats, Atlantic salt meadows, Mediterranean salt meadows, dry heath and eutrophic tall herbs, 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, Nore Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon, Otter, *Vertigo moulinsiana* and the plant Killarney Fern.

Good examples of Alluvial Forest are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include Almond Willow *(Salix triandra)*, White Willow *(S. alba)*, Grey Willow *(S. cinerea)*, Crack Willow *(S. fragilis)*, Osier *(S. viminalis)*, with Iris *(Iris pseudacorus)*, Hemlock Water-dropwort *(Oenanthe crocata)*, Angelica *(Angelica sylvestris)*, Thin-spiked Wood-sedge *(Carex strigosa)*, Pendulous Sedge *(C. pendula)*, Meadowsweet *(Filipendula ulmaria)*, Valerian *(Valeriana officinalis)* and the Red Data Book species Nettle-leaved Bellflower *(Campanula trachelium)*. Three rare invertebrates have been recorded in this habitat at Murphy's of the River. These are: *Neoascia obliqua* (Diptera: Syrphidae), *Tetanocera freyi* (Diptera: Sciomyzidae) and *Dictya umbrarum* (Diptera: Sciomyzidae).

A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland and one listed with priority status on Annex I of

the EU Habitats Directive. These hard water springs are characterised by lime encrustations, often associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Cratoneuron commutatum* var. *commutatum* and *Eucladium verticillatum,* have been recorded.

The best examples of old Oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site. Abbeyleix Woods is a large tract of mixed deciduous woodland which is one of the only remaining true ancient woodlands in Ireland. Historical records show that Park Hill has been continuously wooded since the sixteenth century and has the most complete written record of any woodland in the country. It supports a variety of woodland habitats and an exceptional diversity of species including 22 native trees, 44 bryophytes and 92 lichens. It also contains eight indicator species of ancient woodlands. Park Hill is also the site of two rare plants, Nettle-leaved Bellflower and the moss *Leucodon sciuroides.* It has a typical bird fauna including Jay, Long-eared Owl and Raven. A rare invertebrate, *Mitostoma chrysomelas,* occurs in Abbeyleix and only two other sites in the country. Two flies *Chrysogaster virescens* and *Hybomitra muhlfeldi* also occur. The rare Myxomycete fungus, *Licea minima* has been recorded from woodland at Abbeyleix.

Oak woodland covers parts of the valley side south of Woodstock and is well developed at Brownsford where the Nore takes several sharp bends. The steep valley side is covered by Oak *(Quercus* spp.), Holly *(Ilex aquifolium),* Hazel *(Corylus avellana)* and Birch *(Betula pubescens)* with some Beech *(Fagus sylvatica)* and Ash *(Fraxinus excelsior).* All the trees are regenerating through a cover of Bramble *(Rubus fruticosus* agg.), Foxglove *(Digitalis purpurea)* Wood Rush *(Luzula sylvatica)* and Broad Buckler-fern *(Dryopteris dilatata).*

On the steeply sloping banks of the River Nore about 5 km west of New Ross, in County Kilkenny, Kylecorragh Woods form a prominent feature in the landscape. This is an excellent example of a relatively undisturbed, relict Oak woodland with a very good tree canopy. The wood is quite damp and there is a rich and varied ground flora. At Brownstown a small, mature Oak-dominant woodland occurs on a steep slope. There is younger woodland to the north and east of it. Regeneration throughout is evident. The understorey is similar to the woods at Brownsford. The ground flora of this woodland is developed on acidic, brown earth type soil and comprises a thick carpet of Bilberry *(Vaccinium myrtillus),* Heather *(Calluna vulgaris),* Hard Fern *(Blechnum spicant),* Cow-wheat *(Melampyrum* spp.) and Bracken *(Pteridium aquilinum).*

Borris Demesne contains a very good example of a semi-natural broad-leaved woodland in very good condition. There is quite a high degree of natural re-generation of Oak and Ash through the woodland. At the northern end of the estate Oak species predominate. Drummond Wood, also on the Barrow, consists of three blocks of deciduous woods situated on steep slopes above the river. The deciduous trees are mostly Oak species. The woods have a well established understorey of Holly *(Ilex aquifolium),* and the herb layer is varied, with Brambles abundant. Whitebeam *(Sorbus devoniensis)* has also been recorded.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the flood-plain of the river is intact. Characteristic species of the

habitat include Meadowsweet *(Filipendula ulmaria),* Purple Loosestrife *(Lythrum salicaria),* Marsh Ragwort *(Senecio aquaticus),* Ground Ivy *(Glechoma hederacea)* and Hedge Bindweed *(Calystegia sepium).* Indian Balsam *(Impatiens glandulifera),* an introduced and invasive species, is abundant in places.

Floating River Vegetation is well represented in the Barrow and in the many tributaries of the site. In the Barrow the species found include Water Starworts *(Callitriche* spp.), Canadian Pondweed *(Elodea canadensis),* Bulbous Rush *(Juncus bulbosus),* Milfoil *(Myriophyllum* spp.), *Potamogeton* x *nitens,* Broad-leaved Pondweed *(P. natans),* Fennel Pondweed *(P. pectinatus),* Perfoliated Pondweed *(P. perfoliatus)* and Crowfoots *(Ranunculus* spp.). The water quality of the Barrow has improved since the vegetation survey was carried out (EPA, 1996).

Dry Heath at the site occurs in pockets along the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. The dry heath vegetation along the slopes of the river bank consists of Bracken *(Pteridium aquilinum)* and Gorse *(Ulex europaeus)* species with patches of acidic grassland vegetation. Additional typical species include Heath Bedstraw *(Galium saxatile),* Foxglove *(Digitalis purpurea),* Common Sorrel *(Rumex acetosa)* and Bent Grass *(Agrostis stolonifera).* On the steep slopes above New Ross the Red Data Book species Greater Broomrape *(Orobanche rapum-genistae)* has been recorded. Where rocky outcrops are shown on the maps Bilberry (*Vaccinium myrtillus)* and Wood Rush *(Luzula sylvatica)* are present. At Ballyhack a small area of dry heath is interspersed with patches of lowland dry grassland. These support a number of Clover species including the legally protected Clustered Clover *(Trifolium glomeratum)* - a species known from only one other site in Ireland. This grassland community is especially well developed on the west side of the mud-capped walls by the road. On the east of the cliffs a group of rock-dwelling species occur, i.e. English Stonecrop *(Sedum anglicum),* Sheep's-bit *(Jasione montana)* and Wild Madder *(Rubia peregrina).* These rocks also support good lichen and moss assemblages with *Ramalina subfarinacea* and *Hedwigia ciliata.*

Dry Heath at the site generally grades into wet woodland or wet swamp vegetation lower down the slopes on the river bank. Close to the Blackstairs Mountains, in the foothills associated with the Aughnabrisky, Aughavaud and Mountain Rivers there are small patches of wet heath dominated by Purple Moor-grass *(Molinia caerulea)* with Heather *(Calluna vulgaris),* Tormentil *(Potentilla erecta),* Carnation Sedge *(Carex panicea)* and Bell Heather *(Erica cinerea).*

Saltmeadows occur at the southern section of the site in old meadows where the embankment has been breached, along the tidal stretches of in-flowing rivers below Stokestown House, in a narrow band on the channel side of Common Reed *(Phragmites)* beds and in narrow fragmented strips along the open shoreline. In the larger areas of salt meadow, notably at Carrickcloney, Ballinlaw Ferry and Rochestown on the west bank;

Fisherstown, Alderton and Great Island to Dunbrody on the east bank, the Atlantic and Mediterranean sub types are generally intermixed. At the upper edge of the salt meadow in the narrow ecotonal areas bordering the grasslands where there is significant percolation of salt water, the legally protected species Borrer's Saltmarsh-grass *(Puccinellia fasciculata)* and Meadow Barley *(Hordeum secalinum)* (Flora Protection Order, 1987) are found. The very rare Divided Sedge *(Carex divisa)* is also found. Sea Rush *(Juncus maritimus)* is also present. Other plants recorded and associated with salt meadows include Sea Aster *(Aster*

tripolium), Sea Thrift *(Armeria maritima),* Sea Couch *(Elymus pycnanthus),* Spear-leaved Orache *(Atriplex prostrata),* Lesser Sea-spurrey *(Spergularia marina),* Sea Arrowgrass *(Triglochin maritima)* and Sea Plantain *(Plantago maritima).*

Salicornia and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The habitat also occurs in small amounts on some stretches of the shore free of stones.

The estuary and the other Habitats Directive Annex I habitats within it form a large component of the site. Extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. Good quality intertidal sand and mudflats have developed on a linear shelf on the western side of Waterford Harbour, extending for over 6 km from north to south between Passage East and Creadaun Head, and in places are over 1 km wide. The sediments are mostly firm sands, though grade into muddy sands towards the upper shore. They have a typical macro-invertebrate fauna, characterised by polychaetes and bivalves. Common species include *Arenicola marina, Nephtys hombergii, Scoloplos armiger, Lanice conchilega* and *Cerastoderma edule.*

The western shore of the harbour is generally stony and backed by low cliffs of glacial drift. At Woodstown there is a sandy beach, now much influenced by recreation pressure and erosion. Behind it a lagoonal marsh has been impounded which runs westwards from Gaultiere Lodge along the course of a slow stream. An extensive reedbed occurs here. At the edges is a tall fen dominated by sedges *(Carex* spp.), Meadowsweet, Willowherb *(Epilobium* spp.) and rushes *(Juncus* spp.). Wet woodland also occurs. This area supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail.

The dunes which fringe the strand at Duncannon are dominated by Marram grass *(Ammophila arenaria)* towards the sea. Other species present include Wild Sage *(Salvia verbenaca),* a rare Red Data Book species. The rocks around Duncannon ford have a rich flora of seaweeds typical of a moderately exposed shore and the cliffs themselves support a number of coastal species on ledges, including Thrift *(Armeria maritima),* Rock Samphire *(Crithmum maritimum)* and Buck's-horn Plantain *(Plantago coronopus).*

Other habitats which occur throughout the site include wet grassland, marsh, reed swamp, improved grassland, arable land, quarries, coniferous plantations, deciduous woodland, scrub and ponds.

Seventeen Red Data Book plant species have been recorded within the site, most in the recent past. These are Killarney Fern *(Trichomanes speciosum),* Divided Sedge *(Carex divisa),* Clustered Clover *(Trifolium glomeratum),* Basil Thyme *(Acinos arvensis),* Hemp nettle *(Galeopsis angustifolia),* Borrer's Saltmarsh Grass *(Puccinellia fasiculata),* Meadow Barley *(Hordeum secalinum),* Opposite-leaved Pondweed *(Groenlandia densa),* Autumn Crocus *(Colchicum autumnale),* Wild Sage *(Salvia verbenaca),* Nettle-leaved Bellflower *(Campanula trachelium),* Saw-wort *(Serratula tinctoria),* Bird Cherry *(Prunus padus),* Blue Fleabane *(Erigeron acer),* Fly Orchid *(Ophrys insectifera),* Broomrape *(Orobanche hederae)* and Greater Broomrape *(Orobanche rapum-genistae).* Of these the first nine are protected under the Flora Protection Order 1999. Divided Sedge *(Carex divisa)* was thought to be extinct but has been found in a few locations in the site since 1990. In addition plants which do not have a very wide distribution in the country are found in the site including Thin-spiked Wood-sedge *(Carex strigosa),* Field Garlic *(Allium oleraceum)* and Summer

Snowflake *(Leucojum aestivum).* Six rare lichens, indicators of ancient woodland, are found including *Lobaria laetevirens* and *L. pulmonaria.* The rare moss *Leucodon sciuroides* also occurs.

The site is very important for the presence of a number of EU Habitats Directive Annex II animal species including Freshwater Pearl Mussel *(Margaritifera margaritifera* and *M. m. durrovensis),* Freshwater Crayfish *(Austropotamobius pallipes),* Salmon *(Salmo salar),* Twaite Shad *(Alosa fallax fallax),* three Lamprey species - Sea *(Petromyzon marinus),* Brook *(Lampetra planeri)* and River *(Lampetra fluviatilis),* the marsh snail *Vertigo moulinsiana* and Otter *(Lutra lutra).* This is the only site in the world for the hard water form of the Pearl Mussel *M. m. durrovensis* and one of only a handful of spawning grounds in the country for Twaite Shad. The freshwater stretches of the River Nore main channel is a designated salmonid river. The Barrow/Nore is mainly a grilse fishery though spring salmon fishing is good in the vicinity of Thomastown and Inistioge on the Nore. The upper stretches of the Barrow and Nore, particularly the Owenass River, are very important for spawning.

The site supports many other important animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat *(Myotis daubentoni),* Badger *(Meles meles),* Irish Hare *(Lepus timidus hibernicus)* and Frog *(Rana temporaria).* The rare Red Data Book fish species Smelt *(Osmerus eperlanus)* occurs in estuarine stretches of the site. In addition to the Freshwater Pearl Mussel, the site also supports two other freshwater Mussel species, *Anodonta anatina* and *A. cygnea.*

The site is of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by Swallows before they leave the country.

Landuse at the site consists mainly of agricultural activities – many intensive, principally grazing and silage production. Slurry is spread over much of this area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of the salmonid river and to the populations of Habitats Directive Annex II animal species within the site. 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 main rivers and their 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. There is net fishing in the estuary and a mussel bed also. Other recreational activities such as boating, golfing and walking, particularly along the Barrow towpath are also popular. There is a golf course on the banks of the Nore at Mount Juliet and GAA pitches on the banks at Inistioge and Thomastown. There are active and disused sand and gravel pits throughout the site. Several industrial developments, which discharge into the river, border the site. New Ross is an important shipping port. Shipping to and from Waterford and Belview ports also passes through the estuary.

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, overgrazing within the woodland areas, and invasion by non-native species, for example Cherry Laurel and Rhododendron *(Rhododendron ponticum).* The water quality of the site remains vulnerable. Good quality water is necessary to maintain the populations of the Annex II animal species listed above. Good quality is dependent on controlling fertilisation of the grasslands, particularly along the Nore. It also requires that sewage be properly treated before discharge. Drainage activities in the catchment can lead to flash floods which can damage the many Annex II species present. Capital and maintenance dredging within the lower reaches of the system pose a threat to migrating fish species such as lamprey and shad. Land reclamation also poses a threat to the salt meadows and the populations of legally protected species therein.

Overall, the site 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. The occurrence of several Red Data Book plant species including three rare plants in the salt meadows and the population of the hard water form of the Pearl Mussel which is limited to a 10 km stretch of the Nore, add further interest to this site.

APPENDIX B

Assimilative Capacity Calculations

Waste Assimilative Capacity Assessment for Nurney WWTP

To calculate the WAC the following formula shall be used:

$$(Cmax – Cback) \times F95 \times *86.4 = WAC \text{ kg/day}$$

Where: Cmax = maximum permissible concentration (EQS) (mg/l)

Cback= background 95%ile concentration (mg/l)

F95 = the 95%ile flow in the receiving water/river (m^3/sec)

*Note: (60x60x24)/1000 = 86.4

BOD

$$(2.6 – 7.7) \times 0.18 \times 86.4 =$$

-79.31 kg/day BOD

Ammonia

$$(0.14 – 1.76) \times 0.18 \times 86.4 =$$

-25.19 kg/day NH_3

Orthophosphate

$$(0.075 – 0.111) \times 0.18 \times 86.4 =$$

-0.56 kg/day OrthoP

The above calculations suggest that there is insufficient capacity in the river to assimilate the Orthophosphate (as P), Ammonia and B.O.D. The background levels are in exceedance of the Environmental Quality Standards (EQS) obtained from the European Communities Environmental Objectives (Surface Waters) Regulations 2009.

In order to consider the effect that the addition of the treated effluent from the WWTP would have on the river it is necessary to use a mass balance equation to determine the resultant downstream concentration:

(Cback x Qriver) + (Conc eff x Veff) / (Qriver + Veff) = Cfinal mg/l

Where: Cfinal = resultant concentration in the stream (mg/l)

Cback = background concentration (mg/l)

Conc eff = concentration of parameter in effluent (mg/l)

V eff = rate of effluent dishcharge (l/sec)

Q river = 95%ile flow in the receiving water (l/sec) [95%ile flow x 1000]

For the purposes of this equation the 95%ile concentration of each parameter were used. The 95%ile was calculated using results of monitoring carried out by Water Services (See appendix A)

The results were compared to the Environmental Quality Standards (EQS) obtained from the European Communities Environmental Objectives (Surface Waters) Regulations 2009.

The estimate of the 95 percentile flow in the receiving water was obtained from the E.P.A.'s Hydrometric Section.

BOD

(7.7 x 180) + (6.5 x 0.571) / (180 + 0.571)

= (1386 + 3.712) / (180.571)

= 7.7 mg/l BOD

EQS = 2.6

Ammonia

(1.76 x 180) + (11.12 x 0.571) / (180 + 0.571)

= (316.8 + 6.35) / (180.571)

= 1.79 mg/l NH_3

EQS = 0.14

Orthophosphate

(0.111 x 180) + (1.712 x 0.571) / (180 + 0.571)

=(19.98 + 0.977) / (180.571)

= 0.116 mg/l OrthoP

EQS = 0.075

These results indicate that the theoretical downstream concentration of B.O.D., Ammonia and Orthophosphate (as P) concentration is non compliant with the EQS. The resultant concentrations of BOD, ammonia and orthophosphate were increased by 0mg/l BOD, 0.03mg/l, NH_3 and 0.005mg/l OrthoP respectively from the background concentrations.

The following must be noted:

- The background concentration of B.O.D., Ammonia and Orthophosphate are non compliant with the Environmental Quality Standards (EQS) obtained from the European Communities Environmental Objectives (Surface Waters) Regulations 2009.
- BOD was based on laboratory results where the lowest limit of detection is 2mg/l. The actual background concentration may be under 2mg/l.

Assimilative Capacity Calculations based on the following Theoretical Background Concentrations

(Ref. EPA Presentation "Implications of the Surface Water and Groundwater Environmental Objectives Regulations for the EPA" by Dr. Karen Creed at Seminar dated 14/04/2010 in Athlone)

Orthophosphate mg P/l	0.005
Ammonia (mg N/l)	0.008
B.O.D. (mg/l O2)	0.26

BOD

(0.26 x 180) + (6.5 x 0.571) / (180 + 0.571)

= (46.8 + 3.712) / (180.571)

= 0.28 mg/l BOD

EQS = 2.6

Ammonia

(0.008 x 180) + (11.12 x 0.571) / (180 + 0.571)

= (1.44 + 6.35) / (180.571)

= 0.043 mg/l NH_3

EQS = 0.14

Orthophosphate

(0.005 x 180) + (1.712 x 0.571) / (180 + 0.571)

=(0.9 + 0.977) / (180.571)

= 0.01 mg/l OrthoP

EQS = 0.075

Based on the above calculations, the receiving water has the capacity to assimilate the effluent discharged.

APPENDIX A

Water Services Monitoring Data Upstream of WWTP Discharge

No.	Date of Sampling	BOD mg/l	NO3-N mg/l	Ortho-P mg/l	NH3-N mg/l
1	06/05/2009	2		0.097	0.01
2	25/01/2010	1		0.03	0.1
3	03/02/2010	8		0.11	2
4	04/02/2010	4		0.1	1.2
5	02/03/2010	1		0.096	0.8
6	08/03/2010	1		0.112	1
7	09/03/2010	7		0.09	1.1
	Mean concentrations	3.429	N/A	0.091	0.887
	95%ile concentrations (Cback)	7.700	N/A	0.111	1.760

Water Services Monitoring Data - Outlet

No.	Date of Sampling	BOD mg/l	NO3-N mg/l	Ortho-P mg/l	NH3-N mg/l
1	25/01/2007	6	1.6	20.8	2.6
2	31/01/2007	14	3.4	0.22	4.63
3	08/02/2007	5	4	7.82	3.17
4	02/03/2007	6	0.2	0.41	8.95
5	03/04/2007	7	2.5	0.14	2.66
6	30/05/2007	5	3.2	28.06	4.62
7	11/06/2007	4	1.9	3.09	0.3
8	17/07/2007	7	2.1	NT	NT

9	20/07/2007	4	2	NT	NT
10	21/08/2007	4	1.3	25.7	2.15
11	30/08/2007	9	3	24.01	0.4
12	11/09/2007	2	2.7	12.5	NT
13	09/10/2007	6	7.5	32.02	0.11
14	07/11/2007	5	5	16.74	0.58
15	15/01/2008	6	5.65	NT	NT
16	30/01/2008	7	2.4	13.13	0.28
17	11/02/2008	4	2	10.68	0.09
18	26/02/2008	7	13.6	19.07	0.09
19	05/03/2008	7	2.4	12.12	0.1
20	11/03/2008	4	8.8	11.43	0.1
21	01/04/2008	2	3	2.05	0.1
22	09/04/2008	6	3.5	NT	NT
23	22/04/2008	4	1.7	2.02	1.21
24	07/05/2008	5	4	0.78	0.81
25	19/06/2008	2	2.1	14.46	0.29
26	24/06/2008	3	3.4	23.55	2.62
27	02/07/2008	2	2.3	0.06	0.4
28	08/10/2008		7.5	NT	NT
29	13/01/2009	3	1.1	19.87	0.04
30	21/01/2009	2	2.8	15.71	0.79
31	13/02/2009	5	2.3	0.14	2.58
32	06/03/2009	1	32.7	7.26	0.96

33	02/04/2009	15	44.8	0.66	1.15
34	06/05/2009	5	37.23	0.36	NT
35	07/05/2009	18	35	0.1	0.47
36	08/05/2009	6	31	0.1	0.36
37	09/05/2009	5	26.4	0.1	0.71
38	10/05/2009	4	38.3	0.1	0.7
39	11/05/2009	5	39	0.1	0.86
40	12/05/2009	5	36	0.1	0.75
41	10/06/2009	5	25.1	0.1	0.7
42	18/06/2009	4	14.4	10.67	1.67
43	23/06/2009	4	4.5	NT	NT
44	06/07/2009	13	28	NT	NT
	21/01/2010	28	0.43	3.92	13
	29/01/2010	24	0.53	4.97	3.6
	02/03/2010	4	0.12	8.16	4.5
	Mean Concentration	**6.5**	**8.43275**	**1.711842**	**11.1166**
	95%ile Concentration (Conc eff)	**17.25**	**25.818**	**5.4485**	**37.979**

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