BARRY & PARTNERS
consulting engineers

J. B. Barry and Partners Limited
Tramway House, 32 Dartry Rd,
Dublin 6, Ireland

Phone: +353-1-497 5716
Fax: +353-1-497 5886
E-mail: tramway@jbbarry.ie
Web: www.jbbarry.ie

Administration
Environmental Licensing Programme
Office of Climate, Licensing and Resource Use
Environmental Protection Agency
Headquarters
PO Box 3000
Johnstown Castle Estate
Co. Wexford

The Environmental Protection Agency
- 8 JUN 2009
CORK

Attn:

Date: *4 June 2009*
Ref.: *97120/32/1334*

RE: LIMERICK MAIN DRAINAGE (CITY & ENVIRONS)
Waste Water Discharge Licence Application – Reg. No. D0013-01
Additional Information

Dear Sirs,

We write on behalf of Limerick City Council in respect of the Limerick City Waste Water Treatment Plant.

Further to your recent request for further information in relation to the Limerick Main Drainage Waste Water Discharge Licence Application, Registration No. D0013-01, herewith are:

- Appropriate Assessment – Original + 1 copy
- Amended Non-Technical Summary – Original + 1 copy
- Amended Agglomeration Boundary Drawing – Original + 1 copy
- A CD containing the above documents in pdf format.

We trust that these are sufficient for your present purposes.

Yours faithfully,

David Hodkin
Senior Engineer
J. B. BARRY & PARTNERS LIMITED

ENVIRONMENTAL PROTECTION AGENCY
05 JUN 2009

Enc.

c.c. Seamus Ryan – Limerick City Council (Letter only)

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Directors: J. Desmond Barry BE Eur Ing CEng FIEI MCIWEM RConsEI, T. Niall McDermott BE Eur Ing CEng MIEI MCIWEM RConsEI, Kenneth McIntyre BE Eur Ing CEng FIEI FCIWEM RConsEI, Jerome O'Brien BE Eur Ing CEng FIEI MIStructE RConsEI, Liam Prendiville BE CEng FIEI DipPM DipH&G, Maurice O'Donoghue BE Eur Ing CEng FIEI DipPM RConsEI
Associate Directors: Peter Sheehy BE CEng FIEI MIStructE, Michael J. Clarke BE MASc MBA MIEI, Daniel M. O'Donoghue BE MBA MIEI, Francis J. Ryan BE CEng FIEI, Timothy Finn BE CEng MIEI, Anne Marie Conibear BE CEng MICE MIEI, Martin Deegan BEng MSc CEng MICE MIEI, Garry Flood BSc (Eng) CEng MIEI, Bill O'Leary BBS MBA FCA, Richard Kent MBA DipMS BEng CEng MIEI MICE, Kieran O'Dwyer BE MIEI, Eamonn Sweetman BE CEng MIEI DipPM

Also at: Benchmark Business Centre, 3 Eastgate Road, Eastgate, Little Island, Co. Cork, *Phone:* +353-21-452 4418, *Fax:* +353-21-452 4419, *E-mail:* cork@jbbarry.ie
Dolcain House, Monastery Road, Clondalkin, Dublin 22, *Phone:* +353-1-403 3600, *Fax:* +353-1-459 4357, *E-mail:* dolcain@jbbarry.ie
Unit 9, N5 Business Retail Park, Moneen Road, Castlebar, Co. Mayo, *Phone:* +353-94-903 8013, *Fax:* +353-94-903 8015, *E-mail:* castlebar@jbbarry.ie

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SECTION A: NON-TECHNICAL SUMMARY

The Waste Water Treatment Plant at Bunlicky, southwest of Limerick city centre, and the main lift pumping station at Corcanree together with some 45 kilometres of large diameter interceptor sewers were constructed to meet the requirements of the EU Directive on Urban Waste Water Treatment and to ensure compliance with the Shannon Estuary Water Quality Management Plan.

The Waste Water Treatment Plant has a design capacity of 130,000 population equivalent.

The first stage in the treatment process is **preliminary treatment** which involves the screening and removal of inorganic material, debris, large solids and grit. These materials are then washed and compacted before disposal to licensed landfill.

Preliminary treatment is followed by **primary treatment**, a settlement process to separate the solid material from the waste water. The solids are removed for further treatment within the adjacent sludge treatment installation.

The "settled" waste water is transferred for **secondary or aerobic biological treatment** in the aeration tanks. In the oxygen-rich environment of the aeration tanks micro-organisms absorb and breakdown the organic material in the incoming settled sewage. An anoxic and an aerobic zone together with an internal recirculation flow system, to facilitate the operation of a de-nitrification regime, are provided in each aeration tank.

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After a number of hours the resultant mixture, which is rich in living organisms, is transferred on to a **secondary settlement process** where the biomass (the living organisms) is separated from the treated waste water and returned to the biological phase to sustain the process. The treated waste water, which now meted the standards required by the EU Urban Waste Water Treatment Directive and is in compliance with the Shannon Estuary Water Quality Management Plan, is discharged to the Shannon Estuary through a 1.1 kilometre outfall.

This treated effluent discharge is the sole discharge from the Bunlicky Waste Water Treatment Plant into the aquatic environment of the Shannon Estuary. At times of high flows in the sewers, a storm water overflow at the main lift pumping station at Corcanree also may discharge to the Shannon Estuary.

Currently the plant is operating at 80 % of the ultimate design capacity (130,000 PE). Plant throughput and, therefore, final effluent discharge volumes are expected to increase gradually to design capacity within the next five years.

The sludge produced in the primary treatment and biological phases of the process are forwarded to the adjacent sludge treatment installation for thermal drying.

Key Design Features of the Waste Water Treatment Plant

Design Capacity	130,000	PE
Dry Weather Flow	29,250	m^3/day
Peak Flow Rate (Full Treatment)	865	l/sec
Organic Load	7,800	kg BOD/day

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Final Effluent Performance Standards

BOD	25	mg/l
COD	125	mg/l
Suspended solids	35	mg/l
Ammonia	20	mg/l - N

Monitoring and Testing

The complete treatment process is automated and controlled by a Scada (**S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition) system that continually monitors operating plant status and process quality. The waste water treatment plant is supervised between the hours of 08.00 and 17.30, Monday to Friday and from 08.00 to 12.00 on Saturday. The "quality" of the influent and final effluent is continuously monitored by way of 24-hour composite sampling and testing in the on-site analytical laboratory.

Two grab samples of the influent and effluent are taken each month. These samples are analysed by an independent laboratory and the results are forwarded to the EPA. All on-site analytical test results are collated and included in the monthly Performance Management Report.

Every two months, grab samples are taken from nine different locations along the Shannon Estuary/River both upstream and downstream of the final effluent discharge location. Each sample is tested for: BOD; COD; DO; Ammonia-N; Total Kjedahl Nitrogen; Phosphate; Oxidised Nitrogen; E. Coli and Salinity.

Three members of the site staff are available for call-out to the plant during periods when there is no direct supervision on the site. Call-outs are effected through the GSM telephone system and are activated when a priority alarm is annunciated on the process monitoring and control system.

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Appropriate Assessment

The Waste Water Treatment Plant outfall discharge lies within the boundaries of two Natura 2000 sites: the Lower Shannon cSAC and the Shannon and Fergus Estuaries SPA. An Appropriate Assessment of the discharge was carried out in accordance with the relevant guidance.

The plant has been operating since 2003 and the water quality in the estuary is classified as unpolluted in the EPA water quality report of 2008. The introduction of the scheme, therefore, can be regarded as having no significant adverse impact on the Natura 2000 sites. The internationally and nationally important species and habitats remain in a favourable conservation status.

Attachment Nº A.1:

Drawing No. LMD-97120-DLA-01 - Waste Water Treatment Plant location plan

Drawing No. LMD-97120-DLA-02 - Site layout plan

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All Levels are in Metres and Relate to O.S. Datum Malin

All Maps are Referenced to Irish National Grid (I.N.G.)

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COUNTY CLARE

NORTHERN INTERCEPTOR SEWER SUB-CATCHMENT

WASTE WATER TREATMENT PLANT

CLOONLARA SUB-CATCHMENT

INNER-SOUTHERN INTERCEPTOR SEWER SUB-CATCHMENT

BOUNDARY OF LIMERICK MAIN DRAINAGE AGGLOMERATION

SOUTHERN INTERCEPTOR SEWER SUB-CATCHMENT

COUNTY LIMERICK

COUNTY LIMERICK

CLARINA

ADARE

PATRICKSWELL

DROMBANNA

BALLYNEETY

CASTLECONNELL
Caisleán Uí Chonnaill

LIMERICK
Luimneach

Cratloe
An Chreatalach

Parteen
An Pairtín

Consented Outfall Pipeline

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0 2.5 5
kilometres

LEGEND:

- ZONED RESIDENTIAL BUT NOT DEVELOPED
- ZONED INDUSTRIAL
- ZONED COMMERCIAL
- ZONED INSTITUTIONAL
- ZONED OPEN SPACE BUT POSSIBLE FUTURE RESIDENTIAL
- ZONED GENERAL PURPOSE BUT POSSIBLE FUTURE RESIDENTIAL
- AGGLOMERATION BOUNDARY
- BOROUGH BOUNDARY
- COUNTY BOUNDARY
- SUB-CATCHMENTS BOUNDARY
- TRUNK SEWERS
- COLLECTOR SEWERS
- INTERCEPTOR SEWER

TOWNS ADDED	F.N.	Feb/09	C
LABEL & TITLE REVISION	F.N.	May/08	B
DISCHARGE LICENCE APPLICATION	F.N.	SEPT. '07	A
Revisions:	By:	Date:	Rev.:

Client:

LIMERICK CITY COUNCIL

Project:

LIMERICK MAIN DRAINAGE (City & Environs)

THIS PROJECT IS RECEIVING 80% FINANCIAL ASSISTANCE FROM THE COHESION FUND OF THE EUROPEAN COMMUNITIES

Pat Dromey
Director of Transportation & Infrastructure
Limerick City Council
City Hall
Limerick.

Consulting Engineers:

BARRY & PARTNERS
Michael Punch & Partners
CONSULTING ENGINEERS

Project Office:
Limerick Main Drainage Project Office,
Limerick Business Centre
Raheen Business Park
Raheen, Limerick
Tel: 353-61-484580
Fax: 353-61-484581
E-Mail: Info@lmdpo.com

Scales: As Shown		Date: SEPT.2007			
Drawn By: F.N.	Checked By: D.L.H.	Revision:	A	B	C
Approved By: K.McI					

Title:

**WASTE WATER TREATMENT PLANT
LIMERICK MAIN DRAINAGE
AGGLOMERATION BOUNDARY**

Stage: **DISCHARGE LICENCE APPLICATION**

Drawing. No.: **LMD-97120-DLA-03**

26/02/2009

P:\97 Projects\97120 - LMD Project Man\Civil-Eng\Discharge Licence Application\Drawings

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LIMERICK CITY COUNCIL

PROJECT:

LIMERICK MAIN DRAINAGE WASTE WATER TREATMENT PLANT

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DOCUMENT:

APPROPRIATE ASSESSMENT

Limerick City Council
City Hall
Merchants Quay
Limerick

May 2009

BARRY & PARTNERS
consulting engineers

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DOCUMENT CONTROL SHEET

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SECTION 1 - INTRODUCTION

1.1 Introduction

The Limerick Main Drainage Waste Water Treatment Plant (WWTP) discharges to the River Shannon Estuary at Bunlicky, Limerick through a 1.1 kilometre long outfall.

The Waste Water Treatment plant starting treating wastewater in 2003, and with works completed in 2004. Currently, the plant is operating at approximately 80% of its design capacity of 130,000 PE (Population Equivalent).

The WWTP was constructed in order to remove approximately 18 million litres per day of untreated waste water being discharged into the River Shannon that formerly discharged via approximately 50 outfalls. The catchment for the waste water includes parts of County Limerick and County Clare as well as Limerick City.

The treated waste water meets the standards required by the EU Urban Waste Water Treatment Directive and is in compliance with the Shannon Estuary Water Quality Management Plan.

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The outfall discharge for the site lies within the boundaries of two Natura 2000 sites. These are:

- The Lower Shannon cSAC (Site Code: 002165)
- The Shannon and Fergus Estuaries SPA (Site Code: 004077)

The waste water treatment plant has been operating since 2003. As part of the discharge licence application to the Environmental Protection Agency, Limerick City Council was requested to undertake an Appropriate Ecological Assessment of the existing Bunlicky Waste Water Treatment Plant effluent.

This appropriate Assessment is issued without prejudice to any future surveys and assessments that may be required as part of any planning application or other information that may be made available by the National parks and Wildlife Service (NPWS) or others.

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SECTION 2 - REGULATORY CONTEXT

2.1 Introduction

The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora) formed a basis for the designation of Special Areas of Conservation (SACs). Similarly, Special Protection Areas are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). Collectively, SACs and SPAs are referred to as Natura 2000 sites. In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community. Under Article 6(3) of the Habitats Directive an Appropriate Assessment must be undertaken for any plan or program that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An Appropriate Assessment is an evaluation of the potential impacts of a plan on the conservation objectives of a Natura 2000 site, and the development, where necessary, of mitigation or avoidance measures to preclude negative effects.

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The main aim of the EU Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) is "to contribute towards ensuring biodiversity through the conservation of natural habitats of wild fauna and flora in the European territory of the Member States to which the treaty applies". The Directive was transposed into Irish law by the European Communities (Natural Habitats) Regulations, SI 94/1997.

Article 6, paragraphs 3 of the Habitats Directive state that:

"*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*".

The EU Birds Directive (Council directive 79/409/EEC on the Conservation of Wild Birds) is the main mechanism for protecting wild bird species that occur within the European Union. It provides for the protection, management and control of bird species. According the Article 4 of the

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Birds Directive, "Species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution." The key element of the Birds Directive is that it provides for the creation of Special Protection Areas (SPAs) for the protection of Annex I species as well as for regularly occurring migratory species not listed in Annex I. The Birds Directive is implemented in Ireland under the Wildlife Act (1976) and the Wildlife Amendment Act (2000).

The Natura 2000 network is a European network of ecologically important sites (SPAs and SACs) that have been designated for protection under either the Birds Directive or the Habitats Directive. The statutory agency responsible for these designated areas 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.

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The appropriate assessment is focussed on the potential impacts on the "integrity of the site". This relates to the conservation objectives of the Natura 2000 site. The integrity of the site has been defined as the "coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site will be classified" (PPG 9, UK Department of the Environment, October 1994). These concepts are discussed further in Chapter 5. In accordance with the precautionary principle, if there is insufficient information available to make a judgment decision, it should be assumed that there is potential for a significant effect.

2.2 The Stages in an Appropriate Assessment

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

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to the conservation objectives of the site and to its structure and function.

- **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.

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SECTION 3 - METHODOLOGY AND APPROACH

3.1 Introduction

It has been indicated that the discharge licence application for the Limerick Wastewater treatment plant requires the completion of an Appropriate Ecological Assessment. It should be noted that this assessment differs from the assessment of proposed plans in the fact that the activity which is being assessed is already taking place. The objective of the Appropriate Assessment Process is to evaluate whether there is or there will be a significant impact on the Natura 2000 sites. It is the impacts on the qualifying interests (species and habitats) together with the conservation objectives of these sites that will be assessed.

This assessment was carried out in accordance with the relevant guidance, in particular:

- 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 2002
- Managing Natura 2000 Sites – The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, European Commission, 2000
- Circular L8/08 Water Services Investment and Rural Water Programmes –Protection of Natural Heritage and National Monuments. 2 September 2008

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3.2 Approach

Consultations with EPA on similar projects has indicated that the impacts of the discharge should be the focus of the assessment. A review of areas designated (or being considered for designation) for nature conservation was carried out by consulting the National Parks and Wildlife Service (NPWS). These included Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) for birds.

The approach adopted is summarised as follows:

- The plan or activity being assessed is the discharge of treated effluent to the River Shannon at Bunlicky, Limerick.
- The consequence of this activity is a change to background water quality of the receiving waters.
- The change in the receiving water quality is variable and the effects are attenuated with time and distance.

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- The receptors with the potential capacity to be affected by the discharge are the Natura 2000 sites in the vicinity of Bunlicky. Specifically, the impacts of the discharge (change in water quality) on qualifying species and habitats and conservation objectives associated with the sites is being assessed.
- The pathway by which the receptors can be impacted is through the aquatic environment.
- The discharge from the WWTP at Bunlicky can only impact directly on the aquatic elements of the qualifying interests of the Natura Sites. This would eliminate habitats such as dunes, cliffs etc. as well as terrestrial flora.
- It is possible that indirect impacts could occur where the change in quality could affect the food chain and consequently impact on species that rely on the receiving water environment for their food.
- Due to the fact that the discharge already exists it is possible to assess the impacts on the basis of a number of criteria:

  a) An assessment of the change in water quality as a result the discharge, i.e. the baseline water quality at the Natura 2000 Sites. This water quality can then be compared to the various quality standards to provide an indication of the significance of the alteration in quality.

  b) Identifying whether a pathway exists by which an effect can be imparted to the Natura 2000 site. If no pathway exists then it follows that there can be no impact on a particular qualifying interest.

  c) An examination of whether there has been any significant deterioration in the status of the site. If no deterioration has been observed then it follows that the existing activity is not significantly impacting the site. If deterioration has been observed it still remains to establish whether the discharge is the cause of the deterioration.

- A subjective assessment may be required of results based on various assessment criteria where sufficient information is not available to provide definitive proof.

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3.3 Methodology

Desk Study

A range of data relating to the discharges and the baselines conditions in the estuary as well as data on the relevant designated habitats was reviewed. This data included:

- Submitted discharge licence and supporting data; and
- Various studies undertaken in relation to the flora and fauna of the designated areas in the vicinity of the discharge point.

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Consultation

- The National Parks and Wildlife Service (NPWS) were consulted in relation to designated areas and records of protected species within the study area, and to identify the qualifying interests and habitats of the Natura 2000 sites.

Description of the Natura 2000 Areas in the vicinity

Data was obtained from NPWS including descriptions of the Natura 2000 designated areas in the vicinity and the qualifying interests (species and habitats) together with the conservation objectives.

Assessment of impacts

Once the qualifying interests and conservation objectives which have the potential to be impacted have been established an appropriate assessment will be undertaken. The assessment criteria have been described in 3.1 above. The findings will be contained in the assessment tables in the appendix (as per forms recommended in the EU publication "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".

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SECTION 4 - STUDY AREA, DISCHARGE DETAILS AND WATER QUALITY

4.1 Study Area

The area of interest comprises of the River Shannon Estuary and River Fergus Estuary.

The Shannon is the largest river in Ireland. Between its source in County Cavan and the mouth of the Shannon Estuary, it comprises of a length of approximately 386km and a catchment area of approximately 18,000 km^2. The river drains significant areas of Cavan, Clare, Galway, Kerry, Leitrim, Limerick, Longford, Offaly, Roscommon, Tipperary and Westmeath and lesser areas of Cork, Laois, Mayo, Meath and Sligo. The largest urban area within the catchment is Limerick City, other sizeable towns include Ennis, Tralee, Mullingar, Athlone, Nenagh and Tullamore. The river becomes tidal a short distance upstream of Limerick City and the estuary of the Shannon extends from Limerick westwards to the Atlantic Ocean.

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland, extending from Limerick City and south from Ennis, west as far as Killadysert and Foynes on the north and south shores respectively of the River Shannon (a distance of some 25 km from east to west).

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The estuaries of the River Shannon and River Fergus contain a number of designated conservation sites including Special Areas of Conservation (SAC) and Special Protection Areas (SPA) as discussed in further detail in Chapter 5. The site synopsis for the sites are included in the Appendices of this document.

4.2 Effluent Analysis

The works has demonstrated the ability to adequately remove BOD. The discharge requirements of the Water Framework Directive, (2000/60/EC) and the Urban Waste Water Treatment Directive, (91/271/EEC) are:

- BOD_5 25 mg/l
- COD 125 mg/l
- Suspended Solids 35 mg/l

The characteristics of the effluent discharge is detailed in the Discharge Licence application, and as outlined in Table 4.1 below:

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Table 4.1: Emissions to surface waters – Characteristics of the emissions (Primary Discharge point)

Number	Substance	As discharged	
		Max. daily average	
1	pH	7.2	
2	Temperature	12	
3	Electrical Conductivity(@25oC)	0.75	
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	33	973
5	Ammonia (as N)	0.11	3.24
6	Biochemical Oxygen Demand	23	678
7	Chemical Oxygen Demand	102	3,009
8	Total Nitrogen (as N)	12.7	375
9	Nitrite (as N)	0.085	2.5
10	Nitrate (as N)	4.6	136
11	Total Phosphorous (as P)	0.82	24
12	Orthophosphate (as P)	6.5	-
13	Sulphate S(O4)	116	3,422
14	Phenols (sum) (ug/l)	<10 (µg/l)	<0.29

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The effluent from the waste water treatment plant is sampled monthly on two consecutive days. The permitted number of samples that fail to conform under 91/271/EEC, Table 3 is 5. The discharges, therefore, comply with the regulations.

4.3 Current Water Quality

The rates of exchange of water between the River Shannon and Shannon Estuary are very good. This ensures that when effluent leaves the estuary, very little is returned on the subsequent tide. Current water quality is assessed through the EPA Water quality monitoring program and reports (Clabby *et. al*, 2008) and WFD classification.

EPA Classification

The EPA report 'Water quality in Ireland 2004-2006' presents an assessment of the water quality of the study area. The report confirms that both the Shannon and Fergus Estuaries have good water quality and are classified as 'unpolluted', with no exceedences in nutrient concentrations, accelerated growth of plants, or undesirable water quality observed throughout the survey period. The trophic assessment of the study area is is summarised in Table 4.2 below.

In chapter 4 of the report, the EPA partially accredit the improvement of water quality in estuarine habitats to the introduction of WWTP that treat raw sewage before discharge to estuarine water bodies.

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Table 4.2: Trophic classification of tidal water bodies in the periods 1999-2003 and 2002-2006, and indication of change between these periods

Water Body	Assessment 2002-2006	Assessment 1999-2003	Change from 1999-2003
Fergus Estuary	Unpolluted	Unpolluted	NC
Lower Shannon Estuary	Unpolluted	Unpolluted	NC
Tidal Shannon River	Unpolluted	Intermediate	(+)
Upper Shannon Estuary	Unpolluted	Unpolluted	NC

Source: EPA Water Quality in Ireland 2002-2006

Water Framework Directive Classification

The Shannon and Fergus Estuaries come under the terms of the Water Framework Directive (WFD) (2000/60/EC). This has two major implications for management. Firstly, it sets quality standards for chemical and biological parameters, including an obligation to maintain or to restore to 'good ecological quality; secondly, a timetable has been laid down for a series of actions, up to the final implementation of the WFD in 2015 (discussed further below).

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The WFD specifies the factors, referred to as quality elements, which must be used in determining the ecological status or ecological potential and the surface water chemical status of a surface water body. The lists of quality elements for each surface water category are divided into three groups of elements:

- biological elements;
- hydromorphological elements; and
- chemical and physico-chemical elements.

Draft Regulations were proposed in September 2008 establishing Environmental Objectives and Environmental Quality Standards for the classification and management of Surface Waters and requiring the implementation of measures to reduce water pollution and protect and restore surface waters.

The WFD classification for the upper Shannon Estuary is classified as moderate discussed in section 6 of this report.

Cumulative

There are a number of point source and diffuse discharges that influence the water quality of the Shannon and Fergus Estuaries. These include licensed discharges such as WWTP discharges, Integrated Pollution prevention & Control industry discharges, Local Authority Licensed (Section

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4) discharges, and combined sewer overflow (CSO) discharges. The Shannon estuary also experiences other discharges, such as those from agricultural and aquaculture activities. As the assessment is being made on basis of the receiving water quality, it is the cumulative impact that is being assessed.

4.4 Modelled Water Quality

A mathematical modelling study, developed by MCS International in 1996, was used to develop a numerical model to examine the dispersion of effluent from the WWTP outfall, in terms of water quality parameters under various environmental conditions. The modelling predictions demonstrate that, as a result of the treated effluent discharge from the Limerick City Waste Water Treatment Plant at Bunlicky, and the elimination of existing raw sewage discharges, water quality in the Shannon Estuary will comply with the standards set down in the Shannon Water Quality Management Plan which has been adopted for the Limerick Main Drainage Project. Consequently it is not predicted that there will be any significant adverse impacts on any of the sites of conservation of importance in the Shannon and Fergus Estuaries as a result of the proposed discharge.

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SECTION 5 - BRIEF DESCRIPTION OF NATURA 2000 SITES.

5.1 Designated Sites

A brief synopsis of the potentially affected designated sites and some of the relevant species and habitats with respect to the Appropriate Assessment to be carried our for the licensing of Limerick Waste Water Treatment Plant discharge is outlined below:

Lower River Shannon – cSAC

The Lower River Shannon cSAC (Reference No. 002165) stretches approximately 120 km along the Shannon valley along the Shannon valley from Killaloe to Loop Head/Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus Estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head.

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The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, Molinia meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, Salicornia mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays 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 – Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic Salmon and Otter.

River Shannon and River Fergus Estuaries – SPA

The River Shannon and River Fergus Estuaries SPA (Reference No. 04077) comprises all of the estuarine habitat west from Limerick City and south from Ennis, extending west as far as Killadysert and Foynes on the north and south shores respectively of the River Shannon (a distance of some 25 km from east to west). These form the largest estuarine complex in Ireland. Also included are several areas in the outer Shannon estuary, notably Clonderalaw Bay and Poulnasherry Bay, as well as the intertidal areas on the south shore of the Shannon between Tarbert and Beal Point.

The site, which has vast expanses of intertidal flats and stony or shingle beaches, is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl. Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn.

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This site is of great ornithological interest, being of international importance on account of the numbers of wintering birds it supports. It also supports internationally important numbers of three species, i.e. Dunlin, Black-tailed Godwit and Redshank. In addition, there are 16 species that have populations of national importance. For several of the bird species, it is the top site in the country. Also of note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit.

Fisheries

The Shannon Estuary does support salmon and sea trout populations and as such must be conserved. Atlantic salmon is listed as an Annex II species under the EU habitats Directive and must be protected. Both salmon and migratory brown trout (sea trout) are anadromous fish, spending a significant proportion of their lives at sea. Estuaries serve as the natural linkage for salmon migrating between freshwater and ocean environments, providing the necessary habitat for their transition.

There are a number of aquaculture sites in the Lower and upper Shannon Estuary, including escallops, mussels and oyster fishing.

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Seals and other marine mammals

The Shannon estuary is an important sites for cetaceans (whales, dolphins and porpoises) in Ireland. It is home to a resident group of bottlenose dolphins (*Tursiops truncates*) and is a known calving area. The estuary has been nominated as a candidate SAC (Special Area of Conservation) under the EU Habitats Directive. Under this Directive the National Parks and Wildlife Service is obliged to designate areas (SAC) for species on Annex II, these include bottlenose dolphins (*Tursiops truncatus*) and harbour porpoises (*Phocoena phocoena*). To date the Shannon estuary is only SAC in Ireland for bottlenose dolphins.

The Shannon Dolphin and Wildlife Foundation (accessed May 2009) show records of bottle nose dolphins in the Shannon Estuary. Bottlenose dolphins are regularly recorded from Loop Head in all seasons and in nine months of the year. Based on the number of sightings reported to the SDWF, the population appear to be stable or improving.

5.2 Integrity of the site

The 'integrity of the site' relates to the site's conservation objectives. As regards the connotation or meaning of 'integrity', this can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation.

The 'integrity of the site' has been usefully defined as 'the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified'. A site can be described as having a high degree

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of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required.

When looking at the 'integrity of the site', it is therefore important to take into account a range of factors, including the possibility of effects manifesting themselves in the short, medium and long-term.

5.3 Conservation Status

The conservation status is defined in Article 1 of the directive:

For a natural habitat, Article 1(e) specifies that it is: *'the sum of the influences acting on a natural habitat 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…'.*

For a species, Article 1(i) specifies that it is: *'the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its population …'*.

The Member State has therefore to take into account all the influences of the environment (air, water, soil, territory) which act on the habitats and species present on the site. The favourable conservation status is also defined by Article 1(e) for natural habitats and Article 1(i) for species.

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For a natural **habitat**, it occurs when:

- *'its natural range and areas it covers within that range are stable or increasing;*
- *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;*
- *the conservation status of its typical species is favourable'*.

For a **species**, it occurs when:

- *'its natural range and areas it covers within that range are stable or increasing;*
- *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;*
- *the conservation status of its typical species is favourable"*.

The favourable conservation status of a natural habitat or species has to be considered across its natural range, according to Articles 1(e) and 1(i), i.e. at biogeographical and, hence, Natura 2000 network level. Since, however, the ecological coherence of the network will depend on the contribution of each individual site to it and, hence, on the conservation

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status of the habitat types and species it hosts, the assessment of the favourable conservation status at site level will always be necessary.

5.4 Conservation Objectives

European and national legislation place 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.

According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

- its natural range, and the 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 nor 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.

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The draft conservation objectives (NPWS) for the Natura 2000 sites within the study area are as below:

Lower River Shannon – cSAC

Objective 1: To maintain the Annex I habitats for which the cSAC has been selected at favourable conservation status: Large shallow inlets and bays; Estuaries; Salicornia and other annuals colonising mud and sand; Vegetated sea cliffs of the Atlantic and Baltic coasts; Mediterranean salt meadows (*Juncetalia maritimi*); Coastal lagoons; Mudflats and sandflats not covered by seawater at low tide; Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); Sandbanks which are slightly covered by sea water all the time; Reefs; Perennial vegetation of stony banks; Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation; Molinia meadows on calcareous, peaty or clavey-silt-laden soils (*Molinion caeruleae*); Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*)

Objective 2: To maintain the Annex II species for which the cSAC has been selected at favourable conservation status: *Lampetra fluviatilis,*

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Lampetra planeri, *Petromyzon marinus, Salmo salar, Margaritifera margaritifera, Tursiops truncatus, Lutra lutra*.

Objective 3: To maintain the extent, species richness and biodiversity of the entire site

Objective 4: To establish effective liaison and co-operation with landowners, legal users and relevant authorities.

River Shannon and River Fergus Estuaries – SPA

The site is selected for: Cormorant, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, 20,000 wintering waterbirds

Additional Special Conservation Interests include: Whooper Swan, Pintail, Shoveler, Scaup, Black-headed Gull, Wetland & Waterbirds.

The main conservation objective is:

To maintain the special conservation interests for this SPA at favourable conservation status: Cormorant; Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, 20,000 wintering waterbirds, Whooper Swan, Pintail, Shoveler, Scaup, Black-headed Gull, Wetland & Waterbirds.

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SECTION 6 - POTENTIAL IMPACT ON THE INTEGRITY OF NATURA 2000 SITES

6.1 Natura 2000 Sites with Potential to be Impacted.

The Natura 2000 sites that have the potential to be affected by the proposed project are those which are aquatic related and are in direct contact with the effect caused as result of the discharge (change in water quality).

- Lower River Shannon – cSAC
- River Shannon and River Fergus Estuaries – SPA

Descriptions of these are contained in Section 5 and are detailed in the tables in Appendix 1.

6.2 Conservation Objectives of the SACs and SPAs

The objective is to maintain the favourable conservation status of the species listed in Annex I of the EU Birds Directive, Annex II of the EU Habitats Directive and habitats listed on Annex I of the EU Habitats Directive as well as other important species and habitats. These are detailed in full in Chapter 5.

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6.3 Qualifying Interests with Potential to be Impacted

The impact to be assessed is the impact on the qualifying species and habitats within the designated sites. To this end it is the aquatic based interests that can be impacted directly. Other aquatic dependent interests such as birds (waders and wildfowl) that frequent the qualifying habitat such as the mudflats could be indirectly impacted by a reduction in aquatic food sources. In this case, a deterioration in the eel grass beds could adversely impact the Brent Geese.

For the purposes of this assessment the interests that are considered to have the potential to be impacted directly are the aquatic habitats. These are:

- lagoons;
- alluvial wet woodlands;
- floating river vegetation;
- Molinia meadows;
- estuaries;
- tidal mudflats;
- Atlantic salt meadows;
- Mediterranean salt meadows;

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- Salicornia mudflats;
- sand banks;
- perennial vegetation of stony banks;
- reefs; and
- large shallow inlets and bays.

The interests that have the potential to be impacted indirectly are:

Cormorant, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, 20,000 wintering waterbirds, Whooper Swan, Pintail, Shoveler, Scaup, Black-headed Gull, Wetland & Waterbirds

6.4 Details of Plan / Activity (Discharge)

This assessment is concerned with the Impacts of the discharge of treated effluent from Limerick Waste Water Treatment Plant. The WWTP, currently operating at about 80 % of its design capacity of 130,000 PE (population equivalent), discharges a maximum flow of 865 litres per second of treated waste water via the outfall to the River Shannon at Bunlicky.

The average daily discharge consists of treated waste water, the characteristic of which is discussed in Section 4.

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The effect of this discharge is a change in the receiving water quality and the dispersal plume which extends into the Shannon Estuary. This discharge is one of many that influence the quality of the water in the estuary.

The WWTP replaced some 50 outfalls discharging approximately 18 million litres per day of untreated waste water directly into the River Shannon. The water quality in the Natura 2000 sites, consequently, has been improved significantly by construction of the plant.

The treated effluent meets the standards required by the EU Urban Waste Water Treatment Directive and is in compliance with the Shannon Estuary Water Quality Management Plan.

6.5 Assessment Criteria

The criteria adopted for this assessment are based on an assessment of the existing conditions prevailing in the Shannon Estuary and whether these conditions are causing a significant impact on the qualifying interests of the Natura 2000 sites. Only the interests that are aquatic based are assessed. The qualifying interests that are not directly or indirectly aquatic based have been screened out in Section 6.3. To this end it is assumed

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that there is no connection to land based qualifying interests such as cliffs and land based species and consequently no impact.

The effect of the discharge is an alteration in water quality in the receiving waters. Therefore the available data on water quality has been examined and assessed in terms of whether the water quality could result in the deterioration in the status of the Natura 2000 sites. It should be noted that this is an assessment of the effect of the cumulative discharges to the discharges to the Estuary.

Water Quality.

Data on the water quality in the receiving waters has been provided from:

- The EPA Water Quality in Ireland Report 2008;
- The Draft Shannon RBD Management Plan

EPA Water Quality Report 2008.

This report summarises the water quality in Ireland between 2004 and 2006.

The water quality monitoring program for the Shannon and Fergus Estuaries observed no exceedences in nutrient concentrations, accelerated growth of plants, or undesirable water quality observed throughout the survey period (2002-2006).

The report therefore classifies that the water quality of all sections of the Shannon and Fergus Estuaries as unpolluted. The report also notes that the Tidal Shannon River section has experienced an improvement in water quality between 1999-2003 and 2002-2006, and is also classified as unpolluted. This is partially attributable to the commissioning of the Waste Water Treatment Plant in 2003.

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Draft Shannon River Basin District Management Plan 2008

The draft classifications for Shannon and the Fergus Estuaries under the Water Framework Directive (2000/60/EC) were published at the end of 2008. The Lower Shannon Estuary has a HIGH ecological status, while the Tidal Shannon River, Upper Shannon Estuary and Fergus Estuary have a MODERATE status. The Ecological status is determined by the lower of the quality element values for the physico-chemical and biological elements.

It is acknowledged that discharges from the Limerick WWTP will be subject to Environmental Protection Agency Authorisation and will have to comply with the Urban Wastewater Directive, and the Shannon Estuary Water Quality Management Plan.

In summary, the water quality has been reported to have improved since the commissioning of the treatment plant. The treated waste water meets the standards required by the EU Urban Waste Water Treatment Directive and is in compliance with the Shannon Estuary Water Quality Management Plan.

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There is no doubt that commissioning of the WWTP can only lead to an improvement in the water quality as there is no longer the discharge of 18 million litres of raw sewage to the estuary is no longer taking place.

The relatively minor alteration in the water quality of the estuary (meeting Regulations and the Shannon Estuary Water Quality Plan) is not sufficient to result in an impact on the qualifying interests of the Natura 2000 sites.

Status and Condition of Natura 2000 Sites

The second criterion used to assess whether the discharge is significantly impacting on Natura 2000 sites is the condition of the sites and whether there has a been a deterioration in the qualifying interests. Again if there has been no discernible deterioration than there can be no significant impact.

There are no reports of any loss of integrity of the designated sites. There are no records of any significant decrease in numbers of birds that are protected under the SPA designation.

The conservation objective is to maintain the favourable conservation status of the species listed in Annex I of the EU Birds Directive, Annex II of the EU Habitats Directive and habitats listed on Annex I of the EU Habitats Directive as well as other important species and habitats. At present the conservation status is favourable and the concentrations of Internationally and Nationally important species remain consistent with previous years findings.

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6.6 Potential Impacts on the Integrity of Natura 2000 Sites.

Having established the assessment criteria, the impacts associated with the discharge on the Natura sites have been assessed. The principal potential impact of the discharge is elevated nutrients in the waters in the Estuary. The available water quality data (EPA) does not show nutrient levels elevated above the requisite standards for surface waters. It should be noted that the quality of the discharged effluent from Limerick City has been improved in recent years due to the commissioning of the WWTP. The plant also complies with UWWT regulations regarding discharges to sensitive areas as discussed in Chapter 7. Using the assessment criteria outlined in Section 6.5, the direct and indirect impacts (actual and potential) are summarised below:

- There is no land take associated with the discharge and consequently there will be no reduction or fragmentation in area of the Natura Sites.
- The water quality in the estuary is reported to be unpolluted (EPA Water Quality in Ireland 2008 report) or Moderate (WFD classification).
- While the change of water quality in the Shannon creates the potential for impacts on biodiversity, there is no evidence of the qualifying interests or conservation objectives being directly

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impacted. All the Natura sites are reported to have favourable status.

- The change in the water quality could potentially indirectly impact on the lower end of the food chain that supports the protected bird species. There has been no reported decrease in the numbers of birds in the SPAs. It is considered unlikely that the slightly elevated nutrients would result in a reduction in the foods sources available.
- The improvement in the discharge quality over the past years would be such that the potential to impact on the Natura sites will have reduced.

Overall there is no evidence that the current discharges from Limerick WTPP is resulting in any significant impact on the conservation objectives of the protected areas. It is considered unlikely that the Limerick Wastewater Treatment Plant discharge will result in deterioration in the Protected areas. This conclusion is reinforced by the fact that the Limerick WWTP replaced approximately 50 outfalls that discharged some 18 million litres per day of untreated wastewater to the River Shannon.

6.7 Cumulative Assessment.

There has been and continues to be development, regeneration and improvement of the whole of the Shannon Estuary area. Mitigation policies and objectives for biodiversity and water quality must be implemented and monitored as there is potential for impact on Natura 2000 sites.

The approach to the assessment has been one of investigating whether there has been deterioration in the factors that could result in an impact i.e., the water quality. The water quality in the receiving waters that has been assessed is a reflection of the cumulative impact of the activities in the vicinity of Shannon Estuary.

Similarly the condition of the protected areas is a reflection of all the activities that are taking place. The fact that Internationally and Nationally important species remain consistent with previous years findings indicate that the cumulative effect on the sites is not significant.

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SECTION 7 - PROCESS IMPROVEMENTS AND MITIGATION MEASURES

The Limerick WWTP has been designed to replace some 50 outfalls discharging approximately 18 million litres per day of untreated waste water directly to the River Shannon with treated waste water. It is a fundamental condition that the treated waste water meets the standards required by the EU Urban Waste Water Treatment Directive and is in compliance with the Shannon Estuary Water Quality Management Plan. As a consequence of the improvements, there are no anticipated significant impacts on the conservation objectives of Natura 2000 sites as a result of the discharge of treated effluent from the Limerick Waste Water Treatment Plant.

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SECTION 8 - MONITORING

As per section E of the Discharge Application, the effluent from the waste water treatment plant is sampled monthly on two consecutive days. The samples are split: one part is tested by EPS at the treatment plant and the other by an independent laboratory, Mercury Analytical, in Limerick.

Water sampling and testing of the effluent and the River Shannon upstream and downstream of the WWTP outfall is carried out routinely by the Drainage Department of Limerick City Council which operates the facility on behalf of Limerick City Council, Limerick County Council and Clare County Council.

Birds Count and Monitoring.

The Irish Wetlands Bird Survey (I-WEBS) is a joint scheme of BirdWatch Ireland, National Parks & Wildlife, Dúchas, The Heritage Service and the Wildfowl and Wetlands Trust. It is the principle tool for monitoring wintering waterfowl populations and their wetlands in Ireland. The survey's objectives are to monitor numbers and distribution of waterbird populations and to ascertain long term trends. The survey, comprising monthly co-ordinated site counts by professionals and amateurs over the September to April season, is ongoing allowing monitoring over time enabling assessment of protection at a local level and statutory designation.

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SECTION 9 - CONCLUSIONS

An Appropriate Assessment of the discharge from Limerick Waste Water Treatment Plant was carried out in accordance with the relevant guidance, in particular:

- 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 2002
- Managing Natura 2000 Sites – The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, European Commission, 2000
- Circular L8/08 Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. 2 September 2008

There has been and continues to be development, regeneration and improvement of the whole of the Shannon Region. The mitigation measures and objectives discussed for biodiversity must be implemented and monitored as there would otherwise be potential for impact on Natura 2000 sites.

The approach to the assessment has been one of investigating whether there has been deterioration in the factors that could result in an impact i.e., the water quality. The water quality in the receiving waters that has been assessed is a reflection of the cumulative impact of the activities in the vicinity of the Shannon and Fergus Estuaries.

The water quality in the estuary is classified as unpolluted in the EPA water quality report of 2008. The Limerick WWTP has been designed to replace some 50 outfalls discharging approximately 18 million litres per day of untreated waste water directly to the River Shannon with treated waste water, thereby helping improve the water quality in the vicinity of the Natura 2000 sites. Therefore the introduction of the scheme can be regarded as having no significant adverse impact on the Natura 2000 site.

Similarly the condition of the protected areas is a reflection of all the activities that are taking place. The fact that internationally and nationally important species and habitats remains in a favourable conservation status, indicate that the cumulative effect on the sites is not significant.

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APPENDICES

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Description of the Project	
Description of Project	The Limerick Main Drainage Waste Water Treatment Plant (WWTP) discharges to the River Shannon Estuary at Bunlicky. Currently, the plant is operating at approximately 80 % of its design capacity of 130,000 PE (Population Equivalent). The WWTP replaced approximately 50 outfalls that discharged some 4 million gallons per day of untreated wastewater to the River Shannon estuary. The treated waste water, which meets the standards required by the EU Urban Waste Water Treatment Directive and is in compliance with the Shannon Estuary Water Quality Management Plan, is discharged to the Shannon Estuary through a 1.1 kilometre long outfall.
Location	Bunlicky, Limerick. Discharge direct to Shannon Estuary
Distance from Natura sites	The outfall pipe lies within the Lower River Shannon cSAC and the River Shannon and River Fergus Estuaries – SPA
Land Take	None from any designated site
Emmission	approx. 865 litres per second of treated waste water
Note	The discharge is occurring presently.

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Description of the Natura 2000 sites		
Name	**Natura 2000 Designation**	***Basis***
Lower River Shannon	cSAC, (SY002165)	EU Habitats Directive (92/32/EEC)
Site description	This very large site stretches along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus Estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. The Shannon and Fergus flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian Rocks and the western stretches through Carboniferous Limestone. The Mulkear flows through Lower Palaeozoic Rocks in the upper reaches before passing through Namurian Rocks, followed by Lower Carboniferous Shales and Carboniferous Limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates. Rivers within the subcatchment of the Feale include the Galey, Smearlagh, Owlagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaveela, Gortnageragh and Cahernahallia. The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays 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 – Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic Salmon and Otter. The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River Estuary. Both the Fergus and inner Shannon estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some Eel-grass beds (*Zostera* spp.) and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community, which has been noted from the inner Shannon and Fergus estuaries, is a *Macoma-Scrobicularia-Nereis* community.

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	In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate: swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and Clubrushes (*Scirpus maritimus, S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triquetrus*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*). Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus Estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh Grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Seaspurrey (*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus Estuary: a type of robust Saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the compass of Common Saltmarsh-grass (*Puccinellia maritima*) and Hard-grass (*Parapholis strigosa*). Saltmarsh vegetation also occurs around a number of lagoons within the site. The two which have been surveyed as part of a National Inventory of Lagoons are Shannon Airport Lagoon and Cloonconeen Pool. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa, Cerastoderma glaucum, Lekanesphaera hookeri, Palaemonetes varians, Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of Stonewort (*Chara canescens* and *Chara cf. connivens*). Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris*), Sea Campion (*Silene maritima*), Thrift and Plantains (*Plantago* spp.). A rare endemic Sea Lavender (*Limonium recurvum* subsp. *pseudotranswallinum*) occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Bird's-foot Trefoil (*Lotus corniculatus*). The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top and below this each of the shores has different characteristic species giving a range of different shore types in the pcSAC.

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The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps to ridged bedrock with gullies of sand between the ridges to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include the following:

- stony beaches and bedrock shores - these shores support a typical zonation of seaweeds (*Fucus* spp., *Ascophyllum nodosum* and kelps).
- shingle beaches - the more stable areas of shingle support characteristic species such as Sea Beet, Sea Mayweed (*Matricaria maritima*), Sea Campion and Curled Dock (*Rumex crispus*).
- Sandbanks which are slightly covered by sea water at all times – there is a known occurrence of sand/gravel beds in the area from Kerry Head to Beal Head.
- sand dunes - a small area of sand dunes occurs at Beal Point. The dominant species is Marram Grass (*Ammophila arenaria*).

Flowing into the estuaries are a number of tidal rivers. Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon being broad, generally slow-flowing and naturally eutrophic; the Fergus being smaller and alkaline; while the narrow, fast-flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur
by the rivers, however, improved grassland is most common. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes and sedges and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*Carex pallescens*).

Floating river vegetation characterised by species of Water-crowfoot (*Ranunculus* spp.), Pondweeds (*Potamogeton* spp.) and the moss *Fontinalius antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to county Limerick.

Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with sally (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis.* The herbaceous layer consists of tall perennial herbs. A fringe of Bulrush (*Typha* sp.) occurs on the riverside

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	of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species with occasional Oak (*Quercus robur*), Elm (*Ulmus glabra, U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich. Woodland is infrequent within the site, however Cahiracon Wood contains a strip of old Oak woodland. Sessile Oak (*Quercus petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmeteia*) and Pendulous Sedge (*Carex pendula*). In the low hills to the south of the Slievefelim mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of Birch (*Betula* spp.), Hazel, Oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and Willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora feature prominent Greater wood-rush and Bilberry (*Vaccinium myrtillus*) with a typical range of woodland herbs. Where there is more light available, Bracken (*Pteridium aquilinum*) features. The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, Oak and Birch. There is a good scrub layer with Hawthorn, Willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The hazel is actively coppiced in places. There is a small area of actively regenerating cut away raised bog at Ballyrorheen. It is situated approx. 5km north west of Cappamore Co. Limerick. The bog contains some wet areas with good moss (*Sphagnum*) cover. Species of particular interest include the Cranberry (*Vaccinium oxycoccos*) and the White Sedge (*Carex curta*) along with two other regionally rare mosses including *S. fimbriatum*. The site is being invaded by Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of rhododendron has greatly reduced the overall value of the site. A number of plant species that are Irish Red Data Book species occur within the site - several are protected under the Flora (Protection) Order, 1999: • Triangular Club-rush (*Scirpus triquetrus*) - in Ireland this protected species is only found in the Shannon Estuary, where it borders creeks in the inner estuary. • Opposite-leaved Pondweed (*Groenlandia densa*) - this protected pondweed is found in the Shannon where it passes through Limerick City. • Meadow Barley (*Hordeum secalinum*) - this protected species is abundant in saltmarshes at Ringmoylan and Mantlehill. • Hairy Violet (*Viola hirta*) - this protected violet occurs in the Askeaton/Foynes area. • Golden Dock (*Rumex maritimus*) - noted as occurring in the River Fergus Estuary. • Bearded Stonewort (*Chara canescens*) - a brackish water specialist found in Shannon Airport lagoon. • Convergent Stonewort (*Chara connivens*) - presence in Shannon Airport Lagoon to be confirmed.

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	Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found but none were seen in 1993/94. Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96); Teal (2,319; 1995-96); Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1062; 1995/96), Curlew (1504; 1995/96), Redshank (3228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank. A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4010 individuals at Loop Head, 1987) There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary consisting of at least 56-68 animals (1996). This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. Otter, a species also listed on Annex II of this directive, is commonly found on the site. Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon while the Mulkear catchment excels as a grilse fishery though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of Lamprey. Two additional fish of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon. Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River. There is a wide range of landuses within the site. The most common use of the terrestrial parts is grazing by cattle and some areas have been damaged through overgrazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus Estuary). Further, reclamation continues to pose a threat as do flood relief works (e.g. dredging of rivers). Gravel extraction

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	poses a major threat on the Feale. In the past, Cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds. Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory - except in the upper estuary, reflecting the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences by industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats. Fishing is a main tourist attraction on the Shannon and there are a large number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.	
Qualifying Interests (Species)	***Species***	***Basis***
Lower River Shannon cSAC	Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic Salmon Otter Redshank Turnstone 20,000 wintering waterbirds	Annex II 1349 Annex II 1095 Annex II 1099 Annex II 1096 Annex II 1029 Annex II 1106 Annex II 1355 EU Birds Directive (79/409/EEC)
Qualifying Interests (Habitats)	***Habitat types (as in Annex I of the Habitats Directive), (Codes)***	
	Lagoons Alluvial wet woodlands Floating river vegetation Molinia meadows Estuaries Tidal mudflats Atlantic salt meadows Mediterranean salt meadows Salicornia mudflats	1150 91E0 3260 6410 1130 1140 1330 1410 1310

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	Sand banks, Perennial vegetation of stony banks Sea cliffs Reefs Large shallow inlets and bays.	1110 1220 1230 1170 1160
Conservation Objectives	**Objective 1:** To maintain the Annex I habitats for which the cSAC has been selected at favourable conservation status: Large shallow inlets and bays; Estuaries; Salicornia and other annuals colonising mud and sand; Vegetated sea cliffs of the Atlantic and Baltic coasts; Mediterranean salt meadows (Juncetalia maritimi); Coastal lagoons; Mudflats and sandflats not covered by seawater at low tide; Atlantic salt meadows (Glauco-Puccinellietalia maritimae); Sandbanks which are slightly covered by sea water all the time; Reefs; Perennial vegetation of stony banks; Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation; Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae); Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) **Objective 2**: To maintain the Annex II species for which the cSAC has been selected at favourable conservation status: Lampetra fluviatilis, Lampetra planeri, Petromyzon marinus, Salmo salar, Margaritifera margaritifera, Tursiops truncatus, Lutra lutra. **Objective 3**: To maintain the extent, species richness and biodiversity of the entire site **Objective 4**: To establish effective liaison and co-operation with landowners, legal users and relevant authorities.	

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Description of the Natura 2000 sites		
Name		
Natura 2000 Designation	***Designation***	***Basis***
River Shannon and River Fergus Estuaries SPA	Special Protection Area (SY4077)	EU Birds Directive (79/409/EEC)
Site description	The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises all of the estuarine habitat west from Limerick City and south from Ennis, extending west as far as Killadysert and Foynes on the north and south shores respectively of the River Shannon (a distance of some 25 km from east to west). Also included are several areas in the outer Shannon estuary, notably Clonderalaw Bay and Poulnasherry Bay, as well as the intertidal areas on the south shore of the Shannon between Tarbert and Beal Point. The site has vast expanses of intertidal flats. The main macro-invertebrate community present is a *Macoma-Scrobicularia-Nereis* community which provides a rich food resource for the wintering birds. Other species occurring include Common Cockle (*Cerastoderma edule*), Lugworm (*Arenicola marina*), the polychaete *Nepthys hombergii*, the gastropod *Hydrobia ulvae* and the crustacean *Corophium volutator*. Eelgrass (*Zostera* spp.) is present in places, along with green algae (e.g. *Ulva* spp. and *Enteromorpha* spp.). Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Characteristic species occurring include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*) and Saltmarsh Rush (*Juncus gerardi*). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and club-rushes (*Scirpus maritimus, S. lacustris* subsp. *tabernaemontani)*. Also found is the nationally rare Triangular Club-rush (*Scirpus triqueter*). Elsewhere in the site the shoreline comprises stony or shingle beaches. The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (mean of 59,183 for the 4 seasons 1996-97 to 1999/00), a concentration easily of international importance. The site has internationally important populations of Dunlin (14,987), Black-tailed Godwit (706) and Redshank (1,983) - all figures are average peaks for 3 of the 5 seasons in the 1995/96-1999/00 period. A further 16 species have populations of national importance, i.e. Cormorant (148), Whooper Swan (141), Greylag Goose (88), Shelduck (895), Wigeon (3,025), Teal (1,558), Pintail (40), Shoveler (56), Scaup (76), Golden Plover (4,073), Grey Plover (564), Lapwing (13,007), Knot (686), Bar-tailed Godwit (481), Curlew (1,231) and Greenshank (33). The site is among the most important in the country for several of these species, notably Dunlin (11% of national total), Grey Plover (7.5% of total), Lapwing (6.5% of total), Redshank (6% of total) and Shelduck (6.0% of total). The site is also used by Oystercatcher (363), Ringed Plover (70), Brent Goose (135), Great Crested Grebe (47), Red-breasted Merganser (14), Mallard (247), Turnstone (71), Mute Swan (54), Grey Heron (25), Black-headed Gull (1,233) and Common Gull (194). The Shannon / Fergus system was formerly frequented by a Greenland Whitefronted Goose population but this declined during the 1980s and 1990s and the birds now appear appear to have abandoned the area. The site	

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	provides both feeding and roosting areas for the wintering birds. Habitat quality for most of the estuarine habitats is good. Some species, particularly Whooper Swan and Greylag Goose, utilise areas outside of the site for feeding. Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn. Regular species include Blacktailed Godwit, Whimbrel and Greenshank. Much of the land adjacent to the rivers and estuaries has been reclaimed and improved for agriculture and is protected by embankments (especially along the River Fergus estuary). Further reclamation, especially near to the urbanised and industrial areas continues to pose a threat. The site receives pollution from several sources, including industry and agriculture, but it is not known if this has any significant impacts on the wintering birds. Aquaculture occurs in some areas of the site – future increases in this activity could cause disturbance to the habitats and the associated birds. Common Cord-grass (*Spartina anglica*) is well-established and may threaten some of the estuarine habitats. Some disturbance occurs from boating activities. This site is of great ornithological interest, being of international importance on account of the numbers of wintering birds it supports. It also supports internationally important numbers of three species, i.e. Dunlin, Black-tailed Godwit and Redshank. In addition, there are 16 species that have populations of national importance. For several of the bird species, it is the top site in the country. Also of note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. The site is most effectively censused from the air and this is carried out in most winters.	
Qualifying Interests (Species)	***Species***	***Basis***
	Cormorant, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, 20,000 wintering waterbirds	EU Birds Directive (79/409/EEC)
Additional Special Conservation Interests	Whooper Swan, Pintail, Shoveler, Scaup, Black-headed Gull, Wetland & Waterbirds	EU Birds Directive (79/409/EEC)
Qualifying Interests (Habitats)	***Habitat types (as in Annex I of the Habitats Directive), (Codes)***	
	Tidal Mudflats / Sandflats	1140
Conservation Objectives	To maintain the special conservation interests for this SPA at favourable conservation status: Cormorant; Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, 20,000 wintering waterbirds, Whooper Swan, Pintail, Shoveler, Scaup, Black-headed Gull, Wetland & Waterbirds.	

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Assessment Criteria	
Name	***Lower River Shannon and River Shannon and River Fergus Estuaries***
	Basis
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site.	A waste water treatment plant (WWTP) with a capacity of 130,000 PE (population equivalent) discharging treated waste water into the Shannon Estuary downstream of Limerick City. Since the WWTP removed untreated waste water formerly discharged via approximately 50 outfalls direct to the River Shannon, the water quality has been improved significantly by construction of the plant.
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;**	The WWTP discharges a peak flow of 865 litres per second or treated waste water to the River Shannon. The design dry weather flow is 29,250 cubic metres per day.
• **Land-take;**	The WWTP is not constructed on land within the Natura 2000 sites.
• **Distance from Natura 2000 site or key features of the site;**	The WWTP discharges directly to the River Shannon via a 1.1 kilometre long outfall.
• **Resource requirements;**	None
• **Emissions;**	Treated waste water
• **Excavation requirements;**	None
• **Transportation requirements;**	None
• **Duration of construction, operation etc.;**	Further construction not planned at present
• **Others.**	None
Describe any likely changes to the site arising as a result of:	
○ **reduction of habitat area;**	No reduction in habitat area
○ **disturbance to key species;**	No disturbance to key species
○ **habitat or species fragmentation;**	No habitat or species fragmentation
○ **reduction in species density;**	No reduction in species density
○ **changes in key indicators of conservation value (water quality etc.);**	Water quality in general has been improved by the removal of the discharges of untreated waste water from approximately 50 outfalls direct to the River Shannon. Monitoring tests record no significant change in water quality parameters away from the immediate vicinity of the outfall
○ **climate change.**	Possible increase in surface run-off water reaching the WWTP.
Describe any likely impacts on the Natura 2000 site as a whole in terms of:	
○ **interference with the key relationships that define the**	No interference

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structure of the site; ○ **Interference with key relationships that define the function of the site.**	No interference

Provide indicators of significance as a result of the identification of effects set out above in terms of:	
• **loss;**	None
• **fragmentation;**	None
• **disruption;**	None
• **disturbance;**	None
• **change to key elements of the site (e.g. water quality etc.).**	Improvement in water quality by the prevention of untreated waste water entering the ecosystem.
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.	There will have been a significant improvement in the general water quality consequent upon construction of the WWTP by the removal of the discharges of untreated waste water into the ecosystem from approximately 50 outfalls. There may be some impact close to the end of the WWTP outfall but test data indicates no measurable environmental changes over the Natura 2000 sites in general as a consequence of the WWTP discharges.

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