



Laois County Council

RECEIVING WATER IMPACT ASSESSMENT

Clogh WwTP



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Prepared on behalf of:

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EXECUTIVE SUMMARY

This is a receiving water impact assessment report for the Clogh Waste water Treatment Plant (WwTP). It has been prepared under Section F of the Waste Water Discharge Licensing Application Guidance Note, published by the EPA. This report was prepared during the period November to December 2009 on behalf of Laois County Council by ECOFACT Environmental Consultants Ltd.

The current study was based on information compiled during a desk study and a site visit. Information compiled during the desk study included water quality monitoring information supplied by the EPA, along with information on areas designated for nature conservation obtained from the National Parks and Wildlife Service (NPWS). The field study consisted of a walkover of the existing WwTP site and adjoining river section.

The results of the current assessment suggest that the Clogh WwTP is having no impact on water quality in the Brock Stream, downstream of the WwTP site, with no impact detected in the Erkina River.

The dataset on which this assessment is based is quite limited, due to the lack of chemical and biological data on the Brock stream. It is concluded that the operation of the plant is having no impact on the Erkina River or on the River Nore. It is also concluded that the plant is not having any significant effect on the River Barrow and Nore SAC. Further monitoring of chemical and biological water quality is recommended for the discharges from the plant to the Brock Stream.

An Appropriate Assessment (Stage 1, Screening Assessment) has been completed as part of this receiving water impact assessment using EPA (2009) Waste Water Discharge Licensing Appropriate Assessment Guidance Notes. The conclusion of the Appropriate Assessment is that the existing WwTP is not having a direct impact on the River Barrow and River Nore SAC, and that secondary impacts would not affect the River Barrow and River Nore SAC provided the WwTP continues to operate within the current parameters.

It is recommended that a discharge licence be granted for the plant.

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1. INTRODUCTION

1.1 Background

This report provides a Receiving Water Impact Assessment for the Waste Water Treatment Plant (WwTP) serving Clogh Village, Co Laois. Clogh is located off the Regional Road R434, approximately 6km north east of Rathdowney, see Figure 1. The village of Clogh is served by an EPS pumping and treatment system and an Integrated Constructed Wetland (ICW) system. This WwTP is located on a farm which is accessed via the farmyard located directly across from the school in Clogh village.

Grantstown Wood and Lough Natural Heritage Area (NHA) is located 1.5km to the south of Clogh village. Clogh is in a group village water scheme with Timahoe, Attanagh, Camross, Ballycolla, Vicarstown and Cullahil, Rosenallis, Shanahoe, Killeshin and Ballyfin.

The purpose of the report is to assess whether the existing waste water discharge(s) from the plant in Clogh is having a significant adverse impact on the receiving waters, or any Natura 2000 Site. This report was prepared during the period November to December 2009 by Ecofact Environmental Consultants Ltd. on behalf of the Water Services Section of Laois County Council.

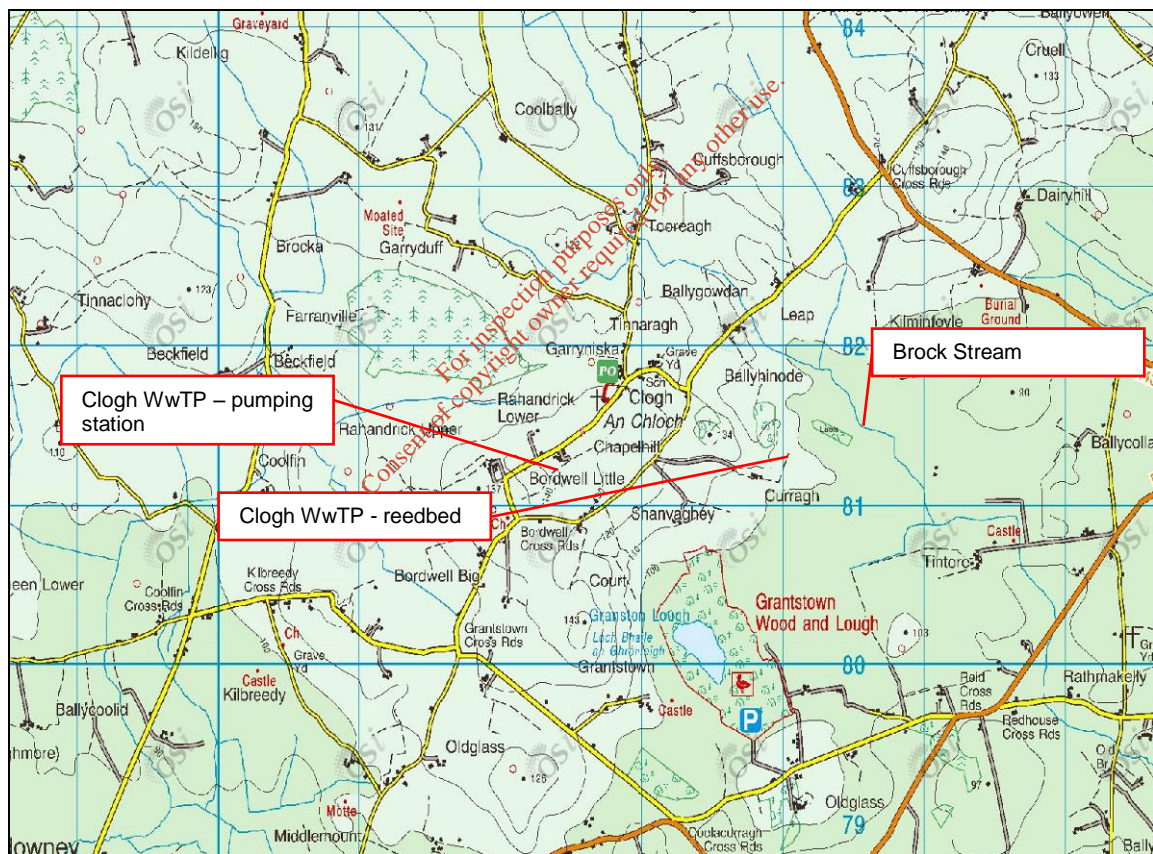


Figure 1 Map showing location of the Clogh WwTP and pumping station. The Brock Stream adjacent to the redbed system is also shown.

1.2 Legislation

The current report was prepared with consideration to the following water quality legislation:-

- European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI 272 of 2009)
- Waste Water Discharge (Authorisation) Regulations 2007 (SI No. 684 of 2007);
- Urban Wastewater Treatment Regulations, 2001 (S.I. No. 254 of 2001);

- European Communities (Water Policy) Regulations, 2003 (SI No. 722) implementing the Water Framework Directive (WFD) 2000/60/EC.
- Water Policy Regulations (S.I. No. 722 of 2003) and Water Policy Regulations (Amendment) (S.I. No. 413 of 2005) implementing the EU Water Framework Directive (2000/60/EC);
- Local Government (Water Pollution) Acts, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998. (S.I. No. 258 of 1998), and Local Government (Water Pollution) (Amendment) Act, 1990. (Act No. 21 of 1990);
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988) implementing Freshwater Fish Directive (78/659/EEC);
- Quality of Bathing Waters Regulations, 1992, and Quality of Bathing Waters Regulations (Amendment), 1996. (implementing Bathing Water Directive, 76/160/EEC);
- European Communities Quality of Surface Water Intended for the Abstraction of Drinking Water Regulations, 1989. (Implementing the Surface Water Directive, 75/440/EEC);
- Water Quality (Dangerous Substances) Regulations, 2001 (Implementing the Dangerous Substances Directive, 76/464/EEC);
- Protection of Groundwater Regulations, 1999. (S.I. No. 41 of 1999);

In addition, cognisance was also taken of the following legislation relating to nature conservation and fisheries:-

- The European Communities (Natural Habitats) (Amendment) Regulations 2005 (S.I. No. 378/2005), The European Communities (Natural Habitats) (Amendment) Regulations 1998 (S.I. No. 233/1998), and the European Community (Natural Habitats) Regulations 1997 (S.I. No. 94/1997) (implementing Council Directives 92/43/EEC and 97/62/EC on the conservation of natural habitats and of wild fauna and flora);
- Wildlife Act, 1976 (S.I. No. 39 of 1976) and the Wildlife (Amendment) Act, 2000 (S.I. No. 71 of 2001);
- Fisheries (Amendment) Act, 1997 (S.I. No. 23 of 1997) and Fisheries (Consolidation) Act, 1959 (S.I. No. 14 of 1959);
- The EU Birds Directive (79/409/EEC).

1.3 Methodology

This report has been prepared under the Waste Water Discharge (Authorisation) Regulations, 2007, using Section F of the Environmental Protection Agencies Waste Water Discharge Licensing Application Guidance Note (EPA, 2008). The Clogh WwTP was visited on the 23rd of November, 2009 and a walk over assessment was carried out on the plant and receiving water.

A desktop review was carried out to identify features of surface water importance within the study area and surrounding region. 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, Special Protection Areas for birds (both internationally important) and proposed Natural Heritage Areas (of national importance). The locations of any designated salmonid waters, recreational and bathing waters and nutrient sensitive areas within the study area were identified through consultation with the Environmental Protection Agency (EPA). Likewise the presence of any important recreational or commercial fisheries was identified through consultation with the Southern Regional Fisheries Board (SRFB).

Technical files and previous reports prepared for the WwTP by Laois County Council were reviewed where available. These reports included the catchment report for the town, prepared as part of the National Urban Waste Water Study. A review of the published literature, including the Laois County Development Plan 2006-2012, was undertaken in order to collate data on the receiving environment, including aquatic species and habitats of conservation

concern in the study area. A range of additional sources of information including scientific reports produced by, and information on the websites of the EPA, NPWS, Laois County Council and other agencies were also reviewed. A full bibliography of information sources reviewed is given in the references section. Ordinance Survey Maps and OS aerial photographs were also reviewed during the desk assessment.

An Appropriate Assessment (Stage 1, Screening Assessment) has been completed and is presented in Appendix 2. The Appropriate Assessment was prepared following the guidance documents:-

- EPA (2009) Waste Water Discharge Licensing Appropriate Assessment Guidance Notes. Notes on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007) Environmental Protection Agency, Co. Wexford.
- European Commission (2001). 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 Environment DG.

The findings of the Receiving Water Impact Assessment were used in used in completing the Appropriate Assessment.

1.4 Consultation

Preparation of this report included consultation with the following agencies and state bodies:-

- Laois County Council (Laois Co. Co.);
- National Parks and Wildlife Service (NPWS);
- Environmental Protection Agency (EPA);
- Southern Regional Fisheries Board (SRFB);
- South Eastern River Basin District Office (SERBDO);
- Geological Society of Ireland (GSI).

2. SCHEME DESCRIPTION

2.1 Introduction

The village of Clogh is served by an EPS pumping and treatment system and an Integrated Constructed Wetland (ICW) system. This WwTP is located on a farm which is accessed via the farmyard located directly across from the school in Clogh village.

2.2 Sewerage Scheme Design

The influent firsts receives primary treatment by the EPS pumping and treatment system, the primary treated waste water is then gravity fed to the Integrated Constructed Wetland (ICW) reed bed system where a high level of secondary waste water treatment insures that no polluted water is discharged to the local watercourse. The ICW reedbed system discharges to a land drain which subsequently joins the 'Brock Stream' as it is known locally. This stream is located 100m to the southeast of the outfall from the ICW in the east corner of the field. This stream is a tributary of the Erkina River and is approximately 80cm – 1m wide within the study area.

2.2.1 Primary Treatment

BOD and suspended solids reduction occurs in the primary treatment stage. Settled sludge and returned sludge from the clarification stage is returned via a duty standby submersible sludge return arrangement to the primary settlement tank. The primary settlement tank is also designed to cater for sludge storage and facilitates anaerobic digestion as well as the storage

of excessive solids and the retention of any fats, oils and greases in the influent. The primary treated sewage then flows by gravity to stage two within the aeration chamber.

The primary treated effluent undergoes aeration, mixing and retention processes in this chamber. Oxygen is supplied to a biofilm via a duty standby Airblower arrangement located in the Outdoor control kiosk. Once the treated effluent passes from the aeration tank any solids/humus sludge settles out and is subsequently pumped back to the primary storage/settlement tank for storage and partial digestion. The pumping station is located ca. 200m behind the farmyard. The sludge return pumps are setup on a duty/standby arrangement. The clarified effluent then flows by gravity to the constructed wetland.

2.2.2 Secondary Treatment

ICW system is designed as a series of five ponds with approximate minimum areas as follows: Pond 1 – 980m³, Pond 2 - 940m³, Pond 3 - 720m³, Pond 4 - 750m³, Pond 5 - 800m³. The typical depth of the wetland system is 0.30-0.35 metres and is assumed throughout the system. The ICW basically functions as a bunded area, which intercepts all waters contaminated; the volume and degree of contamination of what is intercepted are essential design requirements. The following are measured in order to determine the nature of the effluent: BOD₅, COD₅, Phosphorous (Orthophosphate), Ammonia, Nitrate, Nitrite, Suspended Solids and pH. This ICW was designed for a population equivalent of 150. The wetland system was designed as per National Parks and Wildlife Service guidelines, with an area of 20m² per person equivalent 150 x 20 = 3000m³. An additional 1000m³ of area was designed to facilitate in increased treatment bring the total area to 4000m³. Plant species used in this wetland include *Typha* spp., *Glyceria*, *Sparganium* spp., and other emergent helophyte species are used.

It is expected that there will be no discharge from the ICW until the system is receiving the volumes of effluent that it has been designed to treat. The 4000m² ICW is being designed to treat effluent from a population equivalent of 150.

Retention time for this constructed wetland comprises of a minimum treatment area of 4000m² (1 acre) maintained at a typical depth of 0.1 - 0.3m. This provides an available volume of 1200m³. Retention time for effluent from 48 p.e.: 1200m³/9.3m³ = 129 days. Retention time for effluent from 150 p.e: 1200m³/30m³ = 40 days. This residence time will be reduced during higher precipitation events; however the precipitation falling on the surface is layered, maintained on the top and flows preferentially in this clean zone. Water moving from one wetland segment to the next similarly follows the surface route with particular matter moving to the lower layer. The plant species applicable are very adaptive and are able to cope with periods of increased water depth, they will also survive drought should it occur.

2.3 Discharge Standards

The requirements of Urban Wastewater Treatment Directive 91/271/EEC for treatment plants serving more than 2000 population equivalent are:

Biochemical Oxygen Demand (BOD ₅)	25 mg/l O ₂
Chemical Oxygen Demand	125 mg/l O ₂
Suspended Solids (p.e. >10 000)	35 mg/l
Suspended Solids (p.e. 2000 - 10 000)	60 mg/l

The following additional requirements apply for discharges to areas that are deemed to be sensitive:

Total Phosphorus (10 000 – 100 000 p.e.)	2 mg/l
Total Phosphorus (over 100 000 p.e.)	1 mg/l
Total Nitrogen (10 000 – 100 000 p.e.)	15 mg/l
Total Nitrogen (over 100 000 p.e.)	10 mg/l

At the Clogh WwTP, the desired effluent quality from the ICW is as follows: Biochemical Oxygen Demand (BOD) is <5mg/L; Suspended Solids (SS) is <5mg/l; Total ammonia <0.1mg/l; Total phosphorus <0.1mg/l; and Total Nitrogen <1.5mg/l (standards provided by Laois County Council).

2.4 Flows

No flows rates are available for the Clogh WwTP.

2.5 Monitoring

No monitoring data is available upstream or downstream of the outfall from the Clogh WwTP to the Brock Stream via the adjacent land drain.

3. RECEIVING ENVIRONMENT

3.1 Catchment Description

Clogh is located in Hydrometric Area 15, in the River Erkina catchment. There is no watercourse flowing through the village, however a tributary of the River Erkina (EPA code 15/E/01) flows to the north of the village and the Erkina main channel flows to south of the village. The River Erkina is a tributary of the River Nore. The River Erkina rises at Cullahill in Co. Tipperary and generally flows in an easterly direction to meet the River Nore at Durrow. The total length of the River Erkina channel is approximately 35 km. The headwaters of the river comprise a number of smaller unnamed second and third order streams. The River Erkina becomes a 3rd order river at Errill.

Clogh WwTP discharges into the Brock Stream which rises in the townland of Palmershill (EPA code 15_1467). This watercourse flows in a southerly direction and forms a 2nd order stream in the townland of Tooreagh, approximately 1.5km to the north of Clogh village. Another 2nd order stream (EPA code 15_1205) joins the Brock Stream in the townland of Ballyhinode approximately 2km east of Clogh village. The stream is now a 3rd order stream (EPA code 15_317) and is known locally as the 'Brock stream'. This watercourse receives the discharge from Clogh WwTP between the townlands of Ballyhinode and Tintore at E232750, N181430. The Brock stream flows in a south-east direction for approximately 4.5river kilometres before its confluence with the Erkina River at O' Sullivan's Island.

The underlying geology of Clogh village is mainly Waulsortian mudbank limestone, to the south east of the village it is predominantly Visean limestone and calcareous shale and to the south west and North West it is primarily bioclastic limestone.

The upper / elevated reaches of the Brock stream drain mostly basic surface water gleys / groundwater gleys (BminPD) and some mineral alluvium. Clogh village is underlain with basic grey brown podzolic / brown earths (BminDW). The Brock stream is predominantly underlain with basic grey brown podzolic / brown earths (BminDW) as it flows south east to its confluence with the Erkina River, where it is underlain by an area of Fen Peat and mineral alluvium (Source: EPA Envision).

The groundwater surrounding Clogh village is extremely vulnerable to ground water contamination and is in an area of locally important aquifer quality which is karstified. To the south west of the village, from the headwaters of the Brock stream to the confluence with the River Erkina, the groundwater vulnerability is high to moderate. The aquifers in this area are locally important with moderately productive bedrock.

There is a hydrometric station on the River Erkina at Durrow footbridge (McCarthaigh, 1997) downstream of confluence with the Brock Stream. The catchment area of the River Erkina above Durrow footbridge (station 15005) is 379.37km² and the corresponding 95%ile flow is 0.75m³/s (MacCarthaigh, 1997). The dry weather flow (DWF) at Durrow Bridge is 0.4m³/s.

3.2 Water quality

3.2.1 Existing information

3.2.1.1 EPA biological water quality data

The Brock Stream is not monitored by the EPA. The River Erkina is monitored by the EPA with stations located upstream and downstream of the confluence with the Brock stream. The EPA biological water quality monitoring data for the Erkina River rates the watercourse as being of Class A for approximately 32.1%, Class B for approximately 57.1% and Class C for approximately 10.7% of its length.

The bridge near Black Island monitoring station (station code 15/E/01/0400) is located on the Erkina River, approximately 6 river kilometres upstream of Clogh WwTP discharge point. This station has been found to achieve a Q4 'good ecological status' biological water quality rating for two consecutive years from 1995 – 1998, water quality deteriorated in 2001 to Q3-4 'moderate ecological status' and increased again in 2005 to 'good ecological status'.

The closest monitoring station downstream of the Brock Stream confluence on the Erkina River is at Durrow Bridge, located approximately 8 river kilometres downstream of the Clogh WwTP discharge on the Brock Stream. The results at this monitoring station for the period 1995-2007 are presented in Table 2. During the period 2001-2007 the water quality at the Durrow Bridge station remained at Q3-4 'moderate ecological status'.

Table 1 presents a summary of the EPA biological water quality data from the Erkina River; while Table 2 presents the results of the EPA biological water quality monitoring at the stations upstream and downstream of the Clogh WwTP on the Erkina River.

Table 1 Summary of EPA water quality results showing overall results for the Erkina River (Nore). Data is from EPA biological surveys during the period 2004-2006 (adapted from Clabby *et al.*, 2008).

Catchment	Class A	Class B	Class C	Class D	Total (km)
Erkina River (km)	9	16	3	0	28

Table 2 Erkina River (EPA code 15/E/01) Biological Quality Ratings (Q values) from two sites (one u/s and one d/s of the Clogh WwTP discharge point), adapted from EPA website).

Station	Station Location	Distance from WwTP	1995	1998	2001	2005	2007
0400 (u/s of Clogh WwTP)	Br near Black Island	approx. 6 river km upstream	4	4	3-4	4	n/s
0550 (d/s of Clogh WwTP)	Durrow Br	approx. 8 river km downstream	3-4	4	3-4	3-4	3-4

3.2.1.2 EPA chemical water quality data

The EPA does not monitor water quality in the Brock Stream; however it does monitor the chemical water quality of the Erkina River of which the Brock Stream is a tributary. Stations upstream and downstream of the confluence with the Brock stream were reviewed for the current assessment.

Chemical water quality data for the Erkina River is provided in Neil (2008) and Neil (2009) and presented in Appendix 1. The available results upstream and downstream are discussed for individual parameters below.

The mean orthophosphate level upstream (0.06mg/l P) was within the good status ≤ 0.075 (95%ile) limit of the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI 272 of 2009) and decreased by 50% to 0.03mg/l P from upstream of the confluence to downstream of the confluence and was within the high status ≤ 0.045 (95%ile) limit and the good status ≤ 0.035 (mean) limit. The maximum level recorded upstream was 0.13mg/l P and downstream was 0.11mg/l P; both of these values are within the limits of the Surface Water Abstraction Regulations (1989) but exceed the EC Environmental Objectives (Surface Waters) Regulations 2009 (SI 272 of 2009). The Phosphorus Regulations recommend a median standard of 0.03mg/l P for orthophosphate (PO_4^{3-}) in rivers, upstream of

the confluence this median limit was exceeded at 0.05mg/l P however downstream of the confluence the median level for PO_4^{3-} was 0.02mg/l P, therefore within the recommended limit.

The Total Ammonia level decreased from 0.15 mg/l N upstream to 0.02mg/l N downstream and is within the high status ≤ 0.040 (mean) limit downstream of the confluence, under the EC Environmental Objectives (Surface Waters) Regulations 2009 (SI 272 of 2009). The level of Total Ammonia in the Erkina River does not exceed the limit for the Surface Water Abstraction Regulations (1989) at 0.16mg/l N, EC (Drinking Water) (No.2) Regulations, 2007 [SI No. 278 of 2007] at 0.23mg/l N or the Salmonid Rivers Regulations [1988] at 0.78mg/l N.

The BOD (mg/l O_2) level decreased slightly from upstream (1.3 mg/l O_2) to downstream (1mg/l O_2) of the confluence but remained within the high status ≤ 1.3 (mean) and ≤ 2.2 (95%ile) limit at both sites. The DO %Sat levels increased to 90% downstream of the confluence and DO (mg/l O_2) decreased (10.02mg/l O_2) downstream of the confluence. Both upstream and downstream levels were within the lower limit levels for the EC Environmental Objectives (Surface Waters) Regulations 2009 (95%ile) limit (>80% saturation); both stations also complied with the Surface Water Abstraction Regulations (1989) at >60% and the Salmonid Rivers Regulations [1988] at 50%>9mg/l O_2 .

The overall ecological status of the mid River Erkina catchment is characterised as 'moderate status', as determined by the macroinvertebrate and *Margarifera* analysis, according to the South Eastern River Basin District Characterisation Report. The overall risk of the rivers in this catchment is 'at risk of not achieving good status (1a)'.

3.2.1.4 Laois County Council Monitoring Data

During the preparation of the current report, there was no monitoring data available on the Brock Stream upstream or downstream of the discharge point at the Clogh WwTP from Laois County Council.

3.2.3 Dangerous substances

There is no information on dangerous substances in relation to the Clogh WwTP.

3.2.4 Assimilation capacity

There is currently no monitoring data available for discharge volumes, loadings or pathways from Laois County Council in order to assess the assimilation capacities for the Brock stream within the vicinity of the Clogh WwTP.

3.4 Areas designated for nature conservation

Sites of international conservation importance are designated as Special Areas of Conservation (SACs) under the Habitats Directive (1992) and/or Special Protection Areas (SPAs) under the Birds Directive (1979). Together, SACs and SPAs make up the Natura 2000 network of wildlife conservation sites. Sites of national importance for wildlife are designated as Natural Heritage Areas (NHAs) under the Irish Wildlife Act, 2000.

The existing WwTP at Clogh is not located within a designated conservation site. The Brock Stream, which receives the discharge from the WwTP is also not within an area designated for nature conservation. However, the Brock Stream is a tributary of the Erkina River which is designated within the River Barrow and River Nore SAC (site code 002162); the confluence of these watercourses is located approximately 4.5 river kilometres downstream of the Clogh WwTP discharge point. The lower reaches of the Erkina River (from approximately 7km below Rathdowney, Boston Bridge) is designated within the 'River Barrow and River Nore' SAC. Conservation interests of the SAC recorded from the Erkina River include the Nore freshwater pearl mussel *Margarifera durrovensis* which occurs near the Erkina confluence with the Nore, downstream of Durrow; along with white-clawed crayfish *Austropotamobius pallipes*; Atlantic salmon *Salmo salar* and brook lamprey *Lampetra planeri*.

The River Barrow and River Nore SAC is selected for alluvial wet woodlands and petrifying springs, priority habitats on Annex I of the E.U. Habitats Directive, 1992. The site is also selected as a cSAC for old oak woodlands, floating river vegetation, estuary, tidal mudflats, *Salicornia* mudflats, Atlantic salt meadows, Mediterranean salt meadows, dry heath and eutrophic tall herbs, all habitats listed on Annex I of the E.U. Habitats Directive. As well as habitats, the cSAC has been selected due to the presence of invertebrate, fish and mammal species which are listed under Annex II of the EU Habitats Directive, including freshwater pearl mussel (*Margaritifera margaritifera* and its hardwater form *M. m. durrovensis*), freshwater crayfish *Austropotamobius pallipes*, Atlantic salmon *Salmo salar*, twaite shad *Alosa fallax*, the three Irish Lamprey species - sea *Petromyzon marinus*, brook *Lampetra planeri* and river *Lampetra fluviatilis*, the Desmoulin's whorl snail *Vertigo moulinsiana* and Eurasian otter *Lutra lutra*. This SAC is one of only a handful of spawning grounds in the country for twaite shad, and is the most important sites for this species.

Other important animal species are also found in the Barrow/Nore cSAC. These include Daubenton's bat *Myotis daubentoni*, badger *Meles meles*, Irish hare *Lepus timidus hibernicus* and frog *Rana temporaria*, all species listed in the Irish Red Data Book. The rare Red Data Book fish species smelt *Osmerus eperlanus* occurs in the estuary of the River Nore. Two other freshwater mussel species, *Anodonta anatina* and *A. cygnea* are also found in the Nore (Lucey, 1998).

Good quality water is necessary to maintain the populations of the Annex II animal species listed above. Good quality is dependent on controlling fertilisation of the grasslands, particularly along the Nore. It also requires that sewage be properly treated before discharge.

3.5 Protected aquatic flora and fauna

Table 3 presents a list of the protected species recorded in the River Nore catchment and their status. Each species is discussed separately below in relation to the operation of the Clogh WwTP and the Erkina River.

Table 3 Status of fauna listed in the Habitats Directive (92:43:EEC) in the River Nore catchment (adapted from Lucey, 1998 and other sources).

Common name	Scientific name	Main channel	Brock Stream
Pearl mussel	<i>Margaritifera margaritifera</i>	Rare	Absent
White-clawed crayfish	<i>Austropotamobius pallipes</i>	Common	Unconfirmed
Brook lamprey	<i>Lampetra planeri</i>	Common	Unconfirmed
River lamprey	<i>Lampetra fluviatilis</i>	Rare	Absent
Sea lamprey	<i>Petromyzon marinus</i>	Rare	Absent
Twaite shad	<i>Alosa fallax</i>	Rare	Absent
Atlantic salmon	<i>Salmo salar</i>	Common	Unlikely to occur
Eurasian Otter	<i>Lutra lutra</i>	Common	Unlikely to occur

3.5.1 White-clawed crayfish

The white-clawed crayfish is the only freshwater crayfish recorded in Ireland. Populations of the species in the rest of Europe have declined dramatically and Ireland is seen as a unique stronghold for this species in a European context (Reynolds 1998). It is classified as vulnerable and rare in the IUCN Red List and is protected in Ireland under the schedules of the Wildlife Act 1976 (amendment 2000) and it is also listed in Appendices II and V of the Habitats Directive (92:43:EEC). It is generally considered to be widespread in lowland lakes and rivers such as the River Nore, which are underlain by Carboniferous limestone, or its derivative - glacial drift (Reynolds, 1998). The Erkina River contains suitable habitat for white-clawed crayfish and evidence of crayfish carapaces have been noted in the Erkina River. However in a recent study by Reynolds (2007), the white-clawed crayfish was found to be diminishing in the upper main stem of the Nore including the Goul, Gully and Erkina tributaries. Despite this the white-clawed crayfish could potentially occur in the Brock stream.

3.5.2 Lampreys

The brook lamprey is the smallest of the three lampreys native to Ireland and it is the only one of the three species that is non-parasitic and spends all its life in freshwater (Maitland & Campbell 1992). The river lamprey is larger in size than the brook lamprey and exhibits an anadromous¹ life cycle. The sea lamprey is the largest of the Irish lampreys. Brook lamprey and sea lamprey are listed in Appendix II, while river lamprey is listed in both Appendices II and IV of the Habitats Directive (92/43/EEC). All three species are listed in Appendix III of the Bern Convention. All three lamprey species have been recorded from the Nore catchment (Kurtz & Costello 1999) and Brook lamprey are likely to spawn in the River Nore. Brook lamprey occur in the Erkina River (Kurtz and Costello, 1999) and could potentially occur in the Brock Stream. Sea and river lamprey would not occur in the Brock Stream.

3.5.3 Shad

Twaite Shad and Allis Shad are among the rarest species of fish breeding in Irish freshwaters and are listed under Annexes II and V of the EU Habitats Directive. Both species are also listed in Appendix III of the Bern Convention. Shad have an anadromous life cycle and both species are thought to occur in the Barrow/Nore Estuary. These species are confined to the lower reaches of the river and would therefore not occur in the study area.

3.5.4 Atlantic salmon

The Atlantic salmon is listed under Annexes II and V of the EU Habitats Directive and Appendix III of the Bern Convention. It is an economically important species and salmon recreational and commercial fisheries occur throughout Ireland. The Erkina River is an important salmonid river and suitable salmon spawning habitat occurs along the Erkina River; however, the Brock Stream is considered too small for salmon.

3.5.5 Eurasian Otter

The otter *Lutra lutra* is a legally protected species under the Wildlife Act, 1976 (and Wildlife (Amendment) Act, 2000). It is listed under Annex II of the EU Habitats Directive and under Annex II of the Berne Convention. It is found throughout Ireland where it has apparently avoided the population declines that have occurred in many other countries (Hayden and Harrington 2000). The otter is known to occur on rivers, lakes, canals and coasts throughout the country. Otters would likely use the Erkina. The Brock Stream is considered too small for this species.

3.5.6 Freshwater Pearl-mussel

The populations of *M. margaritifera* within the River Nore have been described as a separate hard water species (*Margaritifera durrovensis*), or as a subspecies; however discussion remains as to whether these hard water populations are actually an ecophenotypic hard water form of *M. margaritifera* (Lucey, 2006). The distribution of the Nore freshwater pearl mussel *M. m. durrovensis* is limited to a 14km stretch of the river between Watercastle and Attanagh Bridge. The Erkina River is included in the Barrow / Nore SAC due to the presence of the freshwater pearl mussel at the confluence of the Erkina River with the River Nore downstream of Durrow. However this species would not occur in the Brock Stream.

3.6 Recreational and Commercial fisheries

The freshwater stretches of the River Nore main channel is a designated salmonid river under the EU Fish Directive (78/659/EEC). The Erkina River is an important salmonid river with good stocks of brown trout, good coarse fishing, and spawning and nursery grounds for salmonids. The Brock Stream is considered too small to be of any fisheries importance.

3.7 Water abstractions

¹ Anadromous fish spend most of their adult lives in salt water, and migrate to freshwater rivers and lakes to reproduce.

The closest water abstraction point to Clogh village is located approximately 7.5km to the southwest of the village, near Rathdowney. This is disconnected from the proposed plant both hydrologically and through the extensive distance.

3.8 Designated recreational and bathing waters

There are no designated recreational or bathing waters on the Brock Stream, River Erkina or the River Nore at the confluence with the Erkina River (Source: EPA online Envision map).

3.9 Designated nutrient sensitive areas

There are no designated nutrient sensitive areas on the Brock stream, Erkina river or the River Nore at the confluence with the Erkina River (Source: EPA online Envision map).

4. IMPACT ASSESSMENT

4.1 Introduction

According to the EPA (2008), a discharge from a WwTP would be considered to have a significant adverse effect on the receiving waters if it were to:-

- Cause a deterioration in the chemical status or ecological status (or ecological potential as the case may be) in the receiving body of surface water;
- Cause a deterioration in the chemical status in the receiving body of groundwater;
- Cause the input into groundwater of hazardous substances, except where it is established that the input concerned is in a quantity and concentration so small as to obviate any present or future danger of deterioration in the quality of the receiving groundwater;
- Cause deterioration or result in significant and sustained upward trends in the concentrations of pollutants in groundwater in the case of pollutants that are not hazardous,
- Permanently exclude or compromise the achievement of the objectives established for protected species and natural habitats in the case of European sites where the maintenance or improvement of the status of water is an important factor in their protection or which is inconsistent with the achievement of environmental quality standards established under national Regulations in relation to designated bathing waters, designated shellfish waters, areas designated for the protection of freshwater fish and designated nutrient sensitive areas.

4.2 Impact on water quality

The results of the current assessment are based on limited EPA biological and chemical water quality results for the Erkina River. According to the EPA biological data set, there is a decrease in water quality from Q4 'good ecological status' upstream of the confluence (EPA station 0400) to Q3-4 'moderate ecological status' downstream of the confluence (EPA station 0550). However, between these stations the Brock Stream is one of a number of tributaries entering the Erkina main channel, the most significant of which is the River Goul. These outside receptors could be impacting on the biological water quality of the Erkina River, independent of the impacts arising from water quality in the Brock Stream. The outside receptors upstream are two 1st order stream tributaries which join the Erkina River from the north and the Goul River which flows in from the south ca. 100m downstream of the the Brock Stream confluence. In addition, the Brock stream is met by two 1st order streams before its confluence with the Erkina River, which may be adding further impacts to the water quality of this watercourse.

In relation to the chemical water quality results available for the Erkina River, there is no discernable impact on chemical water quality between these stations, with respect to the key parameters BOD, orthophosphate and Total Ammonia. An overall trend of decrease in these parameter concentrations on the Erkina River downstream of the confluence with the Brock stream was observed. The Erkina River, downstream of the Brock Stream confluence complied with all limits set by the Surface Water Abstraction Regulations (1989), EC (Drinking Water) (No.2) Regulations, 2007 [SI No. 278 of 2007] and the Salmonid Rivers Regulations [1988]. The EPA chemical monitoring stations are similarly expected to be affected by outside receptors both up and downstream of the Brock Stream confluence, negating direct conclusions from the EPA data available.

Further chemical and biological monitoring data on the Brock Stream upstream and downstream of the Clogh WwTP, and also on the Erkina River, directly downstream of the confluence with the Brock Stream would be required to accurately assess the scale of impact arising from this WwTP.

4.3 Impact on areas designated for nature conservation

It is concluded from the data available that the Clogh WwTP is having no perceptible impact on biological or chemical water quality affecting either independently or cumulatively on the Erkina and Nore Rivers. However, further assessment in terms of monitoring immediately downstream of the Brock Stream / River Erkina confluence is required to establish the significance of impacts arising from the plant, which may be impacting on the SAC.

4.5 Impact on fisheries

The Brock Stream is of limited fisheries importance, however due to the absence of monitoring data for the Clogh WwTP and for this stream there is no quantifiable data to establish the impact of the treatment plant affecting the fisheries constraints of the Erkina and Nore Rivers. From the data available (biological and chemical water quality results downstream of the confluence of the Brock and Erkina watercourses) it is considered that there is no significant impact.

4.6 Impact on water abstractions

The nearest water abstraction point to the village of Clogh is approximately 7.5km to the south west of the village near Rathdowney. The discharge point of the Clogh WwTP is to the south east of the village; therefore the abstraction point would not be impacted by the operation of the treatment plant.

4.7 Impact on designated recreational areas

The operation of the Clogh plant would not be affecting any designated recreational areas.

4.8 Impact on designated nutrient sensitive areas

The operation of the Clogh plant would not be affecting any Nutrient Sensitive Areas, as there is no evidence that the plant would be having any effect on the River Nore.

5. RECOMMENDATIONS

It is recommended that biological and chemical monitoring be undertaken on the Brock Stream immediately upstream and downstream of the Clogh WwTP discharge point. Furthermore if a significant impact on water quality occurs downstream of the plant, additional monitoring should be undertaken immediately upstream and downstream of the Erkina River and Brock Stream confluence. It is also recommended that flow rates be derived for the Brock Stream and a water quality model be produced. Information on protected species in the Brock Stream could also be attained by biological sampling.

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PLATES



Plate 1 The Clogh WwTP has a primary and secondary treatment process, the latter is a well developed reed bed system as shown.



Plate 2 The back drain located to west of the reed beds which receives discharge from the latter.



Plate 3 The discharge point (S 33149, G 82454) which flows into the back drain.



Plate 4 The stream known locally as 'Brock stream' flows along the back of this field and meets the back drain at the bottom right hand corner (east corner).



Plate 5 The 'Brock stream' which is a tributary of the River Erkina.

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Appendix 1 Chemical water quality results for the Erkina River

Table 1 2007/2008 EPA chemical water quality results for the Erkina River approximately 11 river kilometers upstream of the Brock stream and Erkina River confluence at Coneyburrow bridge (d/s Rathdowney) (Station code 0200) (Neill 2008; Neill, 2009).

Date	Temp	DO	DO	BOD	Colou	pH	Cond	O-Pho	Ammoni	un	ior	Nitrite	Nitrate	Chloride
	% Sat	mg/l O	mg/L O ₂	Hazen	µS	mg/l P	mg/l N	Amm	mg/l NH ₃	mg/l ↑	mg/l ↑	mg/l Cl		
27/3/07	6.1	96	11.9	1.6	40	8.1	720	0.02	0.06	0.0013	0.011	5.2	21	
17/5/07	13.4	90	9.4	1.4	40	8.2	715	0.09	0	0	0.089	3.8	27	
17/9/07	12	86	9.3	1.4	30	7.9	744	0.09	0.17	0.0035	0.044	4.5	25	
28/11/07	10.1	78	8.8	1.2	60	8.1	773	0.08	0.34	0.095	0.029	2.7	26	
20/2/08	5.5	89	11.2	0.8	30	8.1	732	0.05	0.06	0.0012	0.015	4	19	
21/4/08	8	97	11.5	1.2	40	8.1	754	0.05	0.13	0.0031	0.014	4.5	23	
16/6/08	13.3	94	9.8	1.4	30	8.2	723	0.13	0.43	0.0192	0.072	3.6	26	
26/8/08	14.4	80	8.2	1.1	70	8	749	0.04	0.06	0.0019	0.014	2.7	19	
21/10/08	9.1	89	10.3	1.7	56	8.1	745	0.03	0.13	0.0034	0.015	2.9	20	
Mean	10.21	88.77	10.04	1.31	44	8.08	739.44	0.0644	0.153	0.0142	0.033	3.766	22.888	
Median	10.1	89	9.8	1.4	40	8.1	744	0.05	0.13	0.0031	0.015	3.8	23	

Table 2 2007/2008 chemical water quality results for the Erkina River approximately 5 river kilometers downstream of the Brock stream and Erkina River confluence at the Durrow bridge (Station code 0550) (Neill 2008; Neill, 2009).

Date	Temp	DO	DO	BOD	Colou	pH	Cond	O-Pho	Ammoni	un	ior	Nitrite	Nitrate	Chloride
	% Sat	mg/l O	mg/L O ₂	Hazen	µS	mg/l P	mg/l N	Amm	mg/l NH ₃	mg/l ↑	mg/l ↑	mg/l Cl		
27/3/07	7.4	94	11.3	1.5	30	8	745	0.02	0.03	0.0005	0.02	6.6	22	
17/5/07	13.5	91	9.5	1	20	8.2	737	0.01			0.031	5.2	26	
17/9/07	12.6	115	12.2	1	20	7.9	760	0.01	0.01	0.0002	0.013	5.7	22	
28/11/07	10.2	85	9.5	0.3	20	8	783	0.01	0.02	0.0004	0.016	4.5	23	
20/2/08	6.4	89	11	1	10	7.9	759	0.04	0.05	0.0007	0.03	5.5	20	
21/4/08	8.9	94	10.9	0.9	20	8	791	0.02	0.03	0.0006	0.025	6.1	22	
16/6/08	14	98	10.1	0.7	10	8.1	802	0.11	0.02	0.0008	0.021	5.6	25	
26/8/08	14.8	61	6.2	1.3	60	7.7	758	0.02	0.02	0.0003	0.031	3.3	19	
21/10/08	9.3	83	9.5	1.3	36	7.9	765	0.03	0.03	0.0006	0.025	4.2	20	
Mean	10.78	90	10.02	1	25.11	7.97	766.66	0.03	0.026	0.0005	0.023	5.188	22.11	
Median	10.2	91	10.1	1	20	8	760	0.02	0.025	0.00055	0.025	5.5	22	

Appendix 2 Screening Matrix for the Clogh WwTP

Screening matrix – Clogh WwTP	
Brief description of the project or plan	<i>Continuation of operation of the existing Waste water treatment plant (WwTP) at Clogh, Co. Laois. The WwTP consists of EPS pumping and treatment system and an Integrated Constructed Wetland (ICW) treatment system. Effluent from the WwTP is discharged into a 3rd order stream known as the 'Brock stream' to the east of the Clogh WwTP. The Brock stream flows to the east of Clogh village.</i>
Brief description of the Natura 2000 site	<i>The Brock stream is not part of the River Barrow and Nore SAC. The Brock stream joins the Erkina River approximately 4.5 river kilometres downstream of the Clogh WwTP discharge point. This part of the Erkina River is part of the River Barrow and River Nore SAC site which is selected for a range of protected aquatic species including lampreys, otter, white-clawed crayfish, Atlantic salmon, and freshwater pearl mussel (key aquatic features of the site).</i>
Assessment criteria	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site.	<i>Ongoing discharges from the existing Clogh WwTP could have a negative impact on water quality in the River Barrow and Nore SAC. The discharge point is to the Brock stream which is a tributary of the designated stretch of the River Erkina.</i>
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: <ul style="list-style-type: none"> • size and scale; • land-take; • distance from the Natura 2000 site or key features of the site; • resource requirements (water abstraction etc.); • emissions (disposal to land, water or air); • excavation requirements; • Transportation requirements; • duration of construction, operation, decommissioning, etc.; • other. 	<i>The Clogh WwTP and discharge point is approximately 4.5 river kilometres from the boundary of the SAC site.</i> <i>A proportion of discharged effluent from the Clogh WwTP could reach the SAC site via the Brock stream. To date however, there has been no significant impact on water quality in the Erkina River or the SAC site (This has been demonstrated in the receiving water impact assessment).</i>
Describe any likely changes to the site arising as a result of: <ul style="list-style-type: none"> • reduction of habitat area; • disturbance to key species; • habitat or species fragmentation; • reduction in species density; • changes in key indicators of conservation value (water quality etc.); • climate change. 	<i>There are currently no proposals to alter or expand the treatment plant at Clogh. Changes to the SAC are limited to potential impacts affecting water quality with indirect impacts on aquatic conservation interests.</i>
Describe any likely impacts on the Natura 2000 site as a whole in terms of: <ul style="list-style-type: none"> • interference with the key relationships that define the structure of the site; • interference with key relationships that define the function of the site. 	<i>The main risk would be disruption of the ecological balance in the SAC. It was concluded in the RWIA that the Clogh WwTP was having no impact on chemical water quality either on its own or cumulatively on the Erkina and Nore Rivers</i>
Provide indicators of significance as a result of the identification of effects set out above in terms of: <ul style="list-style-type: none"> • loss; • fragmentation; • disruption/disturbance; • change to key elements of the site (e.g. water quality). 	N/a
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	<i>On the basis of the receiving water impact assessment, it has been concluded that significant effects are unlikely to arise as a result of continued operation of the Clogh WwTP.</i>

Finding of no significant effects report matrix – Clogh WwTP			
Name of project or plan	Clogh waste water treatment plant		
Name and location of Natura 2000 site	River Barrow and Nore SAC located approximately 4.5 river kilometres downstream of the Clogh WwTP discharge point		
Description of the project or plan	Continuation of operation of the existing Waste water treatment plant (WwTP) at Clogh, Co. Laois. The WwTP consists of EPS pumping and treatment system and an Integrated Constructed Wetland (ICW) treatment system. Effluent from the WwTP is discharged into a 3 ^d order stream known as the 'Brock stream' to the east of the Clogh WwTP.		
Is the project or plan directly connected with or necessary to the management of the site (provide details)?	No		
Are there other projects or plans that together with the project or plan being assessed could affect the site (provide details)?	No information on other projects or plans was available during the current assessment.		
The assessment of significance of effects			
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site.	With regard to the SAC, there are no impacts on water quality, surface water abstractions or protected aquatic species for which the SAC site has been selected nor are any impacts envisaged with continued operation of the Clogh WwTP.		
Explain why these effects are not considered significant.	<ul style="list-style-type: none"> - No evidence of deterioration in water quality in the Erkina River after the confluence of the Brock stream - Small size of the treatment plant - Use of a modern treatment system (EPS Pumping and Treatment system and ICW) that is maintained by Laois Co. Co. -dilution of the effluent in the rock Stream prior to reaching the SAC. -assimilation of nutrients released in the discharged effluent into the aquatic environment upstream of the SAC 		
List of agencies consulted: provide contact name and telephone or e-mail address.	N/a		
Response to consultation.	N/a		
Data collected to carry out the assessment			
Who carried out the assessment	Ecofact Environmental Consultants Ltd.; on behalf of Laois County Council		
	Sources of data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed?
	Laois Co. Co. Bord Na Mona: http://www.bnm.ie Central Statistics Office (CSO): http://www.cso.ie Environmental Protection Agency (EPA): http://www.epa.ie National Parks and Wildlife Service (NPWS): http://www.npws.ie Southern Regional Fisheries Board (SRFB): http://www.srfb.ie Southeastern River Basin District http://www.serbd.com	Receiving Water Impact Assessment	Water Services Section of Laois County Council, Aras an Chontae, Portlaoise, Co. Laois. Environmental Protection Agency licensing division
Overall conclusions			
The continued operation of the existing Clogh WwTP would not affect the River Barrow and River Nore SAC provided it continues to operate within the current parameters.			