11th November 2011

Authorisation Reg. No.: A0079-01

Yvonne English
Inspector
Office of Climate, Licensing & Resource Use
Environmental Protection Agency Headquarters
PO Box 3000
Johnstown Castle Estate
County Wexford

Re: Notice in accordance with Regulation 25(c)(ii) of the Waste Water Discharge (Authorisation) Regulations 2007

A Chara

I refer to your letter dated 6th of September 2011 re: Notice in accordance with Regulation 25(c)(ii) of the Waste Water Discharge (Authorisation) Regulations 2007.
Please find attached response to Article 24 Compliance Requirements as requested including the following attachments:

1. Attachment F.2 version 2 Monitoring Data of Drinking Water Abstraction Points within 5Km Radius Downstream of Kilfenora WWTP,
2. Map B.3 Showing location of Private Wells within 5Km of Kilfenora Waste Water Discharge Point.
3. Attachment 1 Response to submission on Kilfenora WWTP Certificate Application.
4. Waste Water Discharge Licensing Appropriate Assessment for A0079-01 Version 2
5. Waste Water Discharge Licensing Kilfenora L8/08 Assessment for Certificate Application A0079-01 Version 2
6. Site Synopsis
7. Attachment A.1 Version 2 Non-Technical Summary.
8. Approval Sheet.

The response has been submitted as one original, one copy plus one copy of the information in PDF format on a CD-ROM.

Mise, le meas,

pp **Myles Carey,**
Administrative Officer,
Water Services.

Comhshaol agus Seirbhísí Uisce
Áras Contae an Chláir, Bothar Nua, Inis, Co. an Chláir

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Approval

Prepared by: Claire Cremin..... Dated: 3/11/2011
A/Assistant Scientist

Approved by: Sean Lenihan..... Dated: Nov 8th 2011
Senior Executive Engineer

Article 24 Compliance Requirements

The responses to this request are set out in the numerical order in which they occur in the original request

1. *Provide details of the design criteria of the proposed constructed percolation area. Include figures to demonstrate that the proposed percolation area will be capable of accepting the volume of effluent from the waste water treatment plant.*

   At the time of the application preparation the discharge from the Kilfenora WWTP was the subject of a scheme upgrade to be funded under the Water Services Investment Programme (WSIP) 2007 - 2009.
   The proposals in the preliminary report, issued in 2007, and which had been forwarded to the Department of Environment, Heritage and Local Government, recommended the upgrade of the WWTP, and included provision of tertiary treatment in the form of a constructed percolation area which would permit flows from the WWTP to percolate indirectly to groundwater.
   The scheme to upgrade the Kilfenora WWTP was discontinued and the upgrade works at the WWTP are not included in the WSIP scheme for 2010 – 2012. There are no upgrade works is in progress at present. Any further works to upgrade the treatment plant will be determined by a priority assessment of needs in the county overall, and will take account of the current financial climate.

2. *Submit an impact assessment of the discharge on the receiving groundwater. Having regard to the European Communities Environmental Objectives (Groundwater) Regulations, 2010 in the impact assessment.*

   A sample of the receiving waters could not be taken in the preparation of the application as the discharge from the Kilfenora WWTP drains directly to groundwater. However taking account that the major flow from the Ballybreen swallow hole, drains east to the springs feeding the upper portion of the River Fergus, an assessment of water quality at known water abstraction points (private water potable supplies) downstream of the discharge point at Ballybreen was undertaken. Monitoring data of the known abstraction points is provided in Attachment F.2 V.2.

Water quality in private water supplies within a 5Km radius downstream of the discharge is assessed having regard to the European Communities Environmental Objectives (Groundwater) Regulations, 2010. Also included in this assessment is water quality data from Groundwater monitoring at Elmvale Springs and Kilnaboy (Pumphouse). Both of these monitoring locations are situated over 10km downstream of the Ballybreen swallowhole. The results indicate compliance with the requirements of the European Communities Environmental Objectives (Groundwater) Regulations, 2010, with one exceedance noted for the parameter Aluminium, when the Groundwater Threshold range was marginally exceeded at Elmvale Springs (152µg/l Al was recorded as opposed to the Threshold Value of 150 µg/l Al). The results do not indicate a significant impact from the discharge on groundwater quality. A map showing the location of the private water supplies is provided in Attachment B.3 V.2.

However with reference to the dye tracing study undertaken (as provided with the certificate application) the dye traces indicated an emergence of a portion of the discharge at Elmvale Springs only. In light of this, Clare County Council are undertaking another dye trace study to identify if there is emergence of the discharge from the Kilfenora WWTP at the other groundwater monitoring locations used in this assessment.

3. *A submission was received by the Agency on the 17th December 2010 which raised a number of issues in relation to the Kilfenora Agglomeration. Submit a response to the Agency addressing the issues raised in the submission received.*

   A response to the submission is provided as Attachment 1.

- The Non-Technical Summary submitted with the Certificate application has been amended to reflect the changes submitted in response to this request and is provided as Attachment A.1 Kilfenora V.2.

Attachment F.2

Version 2

Monitoring Data of Drinking Water Abstraction Points within 5Km Radius Downstream of Kilfenora WWTP

Table showing results of analysis of Private Group Water Supplies downstream of Swallow Hole at Ballybreen

Supply Name		Ballygannor	Rusheen	Tullagh	Ballybane	Caherminaun	Lismoher
Site Code		0300PRICGW4	0300PRIGW5	0300PRIGW25	0300PRIGW95	0300PRIGW96	0300PRIGW97
Date		08/09/2003	25/06/2003	01/04/2003	01/04/2003	01/04/2003	25/06/2003
	GW TV						
Aluminium (Al) as mg/l	150 µg/l			<0.004	<0.004		
Ammonium(NH4) as mg/l	65 -175 µg/l	0.04	NFR	0.02	0.01	0.01	
Colour (Apparent)		<5	60	5	<5	5	10
Conductivity @ 25°C	800 - 1,875	487	757	568	833	822	617
Copper (Cu) as mg/l	1500 µg/l			16.7	6.23	<1	
Faecal Coliforms no/100mls		0	0	0	0	0	0
Iron as µg/l		9	992	18	72	1028	26
Lead as µg/l	18.75 µg/l	<2	<2	<2	<2		<2
Manganese as µg/l		2	712	3.13	2.63	55.9	2.28
Nitrates (N03) as mg/l	37.5 mg/l	20.08	1.77	<0.1	0.9	0.4	3.98
Nitrites(N02) as µg/l	375 µg/l	0.07	0.059	0.01	0.002	0.01	0.003
Odour Dilution at 25°C		0	0	0	0	0	0
pH pH units		7.64	7.04	7.21	6.98	6.81	7.28
Taste Dilution at 25°C		0	0	0	0	0	0
Temperature °C		16	19.3	12.1	14.1	13.6	19.1
Total Bacteria @ 22°C		0	0	14	10	0	1
Total Bacteria @ 37°C		5	0	0	2	1	6
Total Coliforms		0	0	0	0	0	0
Turbidity		0.34	27	0.6	0.4	3	0.7

GW TV: Groundwater Threshold Value *European Communities Environmental Objectives (Groundwater) Regulations, 2010*

Supply Name: Lemenagh Roughan
Site Code: 0300PRI2009

Date	GW TV	01/04/03	03/10/05	11/10/05	13/02/06	12/06/06	12/02/07	10/09/07	05/11/07	07/04/08	22/09/08	09/02/09	06/07/09
Aluminium (Al) as mg/l	150 µg/l	0.00785	NN		NN	NN	NN	NN		NT	NT	NT	
Ammonium(NH4) as mg/l	65 -175 µg/l	0.03	0.02		0.01	0.02	0.01	<0.01		<0.03	0.03	<0.03	0.04
Clostridium Perfringens after 24 hrs			8		0	0	0	0		0	0	0	0
Coliform Bacteria			0		0	1	0	7	0	0	0	0	3
Colour (Apparent)		<5	20		5	<5	<5	5		5	10	5	22
Conductivity @ 25°C	800 - 1,875	549	449		390	480	356	491		442	480	437	414
Copper (Cu) as mg/l	1500 µg/l	11.1											
Faecal Coliforms no/100mls		0			0	0	0	0	0	0	0	0	2
Fluoride		NT											
Free Chlorine		NT											
Iron as µg/l		23	NN		20	NN	15	NN		NT	NT	NT	
Lead as µg/l	18.75 µg/l	<2											
Manganese as µg/l		<2											
Nitrates (N03) as mg/l	37.5 mg/l	3.1											
Nitrites(N02) as µg/l	375 µg/l	0.003	NN		NN	NN	NN	NN		NT	NT	NT	
Odour Dilution at 25°C		0	ND		ND	ND	ND	ND		ND	ND	ND	
pH pH units		7.2	7.48		7.47	7.15	7.67	7.26		7.61	7.14	7.92	7.41
Taste Dilution at 25°C		0	ND		ND	NN	ND	ND		ND	ND	ND	
Temperature °C		13.6											
Total Bacteria @ 22°C		4											
Total Bacteria @ 37°C		5											
Total Chlorine		NT											
Total Coliforms		3											
Turbidity		0.6	3.51		0.45	0.2	0.25	0.37		0.38	0.74	0.72	1.39
Cryptosporidia				0									
Giardia				0									

GW TV: Groundwater Threshold Value *European Communities Environmental Objectives (Groundwater) Regulations, 2010*

Supply Name: Lemenagh Roughan
Site Code: 0300PRI2009

Date		08/07/09	20/07/09	28/07/09	30/07/09	01/03/10	08/03/10	23/05/11	01/06/11	07/06/11	14/06/11
	GW TV										
Aluminium (Al) as mg/l	150 µg/l					NT	NT	NT			
Ammonium(NH4) as mg/l	65 -175 µg/l					<0.03	<0.03	<0.03			
Clostridium Perfringens after 24 hrs						3	0	6	<1	<1	<1
Coliform Bacteria		10	3	0	0	0	0	11	<1	<1	<1
Colour (Apparent)						18	9	18			
Conductivity @ 25°C	800 - 1,875					380	391	310			
Copper (Cu) as mg/l	1500 µg/l										
Faecal Coliforms no/100mls		6	1	0	0	0	0	11	<1	<1	<1
Fluoride											
Free Chlorine											
Iron as µg/l								NT			
Lead as µg/l	18.75 µg/l										
Manganese as µg/l											
Nitrates (N03) as mg/l	37.5 mg/l										
Nitrites(N02) as µg/l	375 µg/l					NT	NT	NT			
Odour Dilution at 25°C						ND	ND	NTND			
pH pH units						7.67	7.4	7.61			
Taste Dilution at 25°C						ND	NT	ND			
Temperature °C											
Total Bacteria @ 22°C											
Total Bacteria @ 37°C											
Total Chlorine											
Total Coliforms											
Turbidity						0.06	0.7	1.53			
Cryptosporidia											
Giardia						NT					

GW TV: Groundwater Threshold Value *European Communities Environmental Objectives (Groundwater) Regulations, 2010*

Elmvale Springs Parameter	Groundwater TV[1]	1997 **	1998**	Apr-00	Oct-01	Oct- 02	Apr-03	Nov-04
PH	* 6.5 - 9	NT	NT	NT	NT	NT	7.42	7.48
Conductivity	800 - 1875µs/cm	355	366	424	422	544	467	468
Nitrate	37.5 mg/l NO_3	5.20	6.70	3.00	3.98	11.05	3.09	0.70
Nitrite	375µg/l NO_2	<0.100	<0.100	0.01	<0.001	<0.001	0.021	0.003
Hardness	* mg/l $CaCO_3$	170	189	193	240	298	246	NT
Alkalinity	* mg/l HCO_3	164	168	174	180	268	212	NT
Fluoride	* mg/l Fluoride	<0.250	<0.250	0.130	NT	0.130	0.084	0.050
OrthoPhosphate as mg/l	35µg/l P	<0.50		0.04	0.02	0.04	<0.01	0.003
Iron	* mg/l Fe	0.300	0.210	0.150	0.210	0.060	<0.004	0.086
Ammonium as mg/l	65 - 175µg/l N	<0.01	<0.01	0.03	<0.03	0.1	<0.03	NT
Chloride	24 - 187.5mg/l C1	19	21	32	18	22	28	NT
Coliform (total)	* nos/100mls	300	42	60	NT	27	10	308
Coliform (faecal)	* nos/100mls	250	10	10	NT	30	0	20
Calcium	* mg/L Ca	63	70	73	81	102	79	72
Magnessium	* mg/l Mg	3	3	4	4	5	4	<5
Potassium	* mg/l K	2.4	1.5	1.41	1.78	2.01	1.43	<5
Sodium	150 mg/l Na	13	13	14	12	13	14	14
Sulphate	187.5 mg/l SO4	9	8	9	9	11	11	<20
Aluminium	150 ug/l Al	113	52	64	55	13	152	24
Manganese	* ug/l Mn	6	8	23	5	3	35	5
Barium	* ug/l Ba	12	14	11	11	15	11	<20
Boron	750 ug/l B	16	16	9	15	27	17	<100
Cadmium	3.75 ug/l Cd	<5.0	<5.0	0.3	0.4	0.3	<1.0	<0.5
Chromium	37.5 ug/l Cr	<5	<5	0.5	0.8	3.5	<0.5	<5
Copper	1500 ug/l Cu	8	11	3	4	2	1	<20
Lead	18.75 ug/l Pb	<20	<20	4	2	<2	<2	<2.5
Mercury	0.75 ug/l Hg	<1	NT	<0.008	<0.008	NT	0.013	<0.015
Nickel	15 ug/l Ni	10	<10	3	<3	<3	<3	<2
Selenium	* ug/L Se	<50	<50	<1	<1	<1	<1	2.1
Silver	* ug/l Ag	<5.0	<5.0	<1	<1	<1	<1	<2
Strontium	* ug/l Sr	87	93	96	100	123	97	100
Zinc	* ug/l Zn	122	47	5	7	16	8	<20
Antimony	* ug/l Sb	<20	<20	<3	<3	<3	<3	0.29
Zirconium	* ug/l Zr	NT	NT	NT	<2	<2	<2	NT

Groundwater TV[1] Groundwater Threshold Value Range *European Communities Environmental Objectives (Groundwater) Regulations, 2010*

* Limit not listed

** Sampled and tested by the GSI

NT: Not tested

Kilnaboy (Pumphouse) Parameter	Groundwater TV[1]	2006	2008	2010
pH	* 6.5 - 9	7.4	7.39	7.19
Conductivity	800 - 1875µs/cm	417	749	675
Nitrate	37.5 mg/l NO_3	5.746	7.594	9.690
Nitrite	375µg/l NO_2	0.020	0.012	0.002
Hardness	* mg/l $CaCO_3$	230	42	386
Alkalinity	* mg/l HCO_3	228	248	366
Fluoride	* mg/l Fluoride	0.020	0.021	0.024
Orthophosphate as mg/l	35µg/l P	<0.0092	<0.001	<0.001
Iron	* mg/l Fe	0.010	0.055	0.037
Ammonium as mg/l	65 - 175µg/l N	0.01	0.04	<0.03
Chloride	24 - 187.5mg/l C1	16.5	25.43	30.37
Coliform Bacteria	* nos/100mls	0	0	0
E.Coli	* nos/100mls	0	0	0
Calcium	* mg/L Ca	62.9	116.4	144.5
Magnesium	* mg/l Mg	15.9	16.2	19.9
Potassium	* mg/l K	2.1	0.9	1.0
Sodium	150 mg/l Na	8.7	14.3	17.1
Sulphate	187.5 mg/l SO_4	9.8	8.61	7.50
Aluminium	150 ug/l Al	<5.0	<5.0	<5.0
Manganese	* ug/l Mn	4.5	<1.0	<1.0
Barium	* ug/l Ba	388.5	6.6	9.5
Boron	750 ug/l B	<20	<20	<20
Cadmium	3.75 ug/l Cd	<0.1	NT	NT
Chromium	37.5 ug/l Cr	<1.0	NT	NT
Copper	1500 ug/l Cu	54.5	<3.0	12
Lead	18.75 ug/l Pb	8.4	<1.0	0.4
Mercury	0.75 ug/l Hg	<0.02	<0.02	<0.2
Nickel	15 ug/l Ni	0.8	2.4	1.5
Selenium	* ug/L Se	0.3	NT	NT
Silver	* ug/l Ag	<5.0	NT	NT
Strontium	* ug/l Sr	184.1	NT	NT
Zinc	* ug/l Zn	77.7	1246.0	98.2
Antimony	* ug/l Sb	<0.1	NT	NT
Zirconium	* ug/l Zr	<1.0	NT	NT

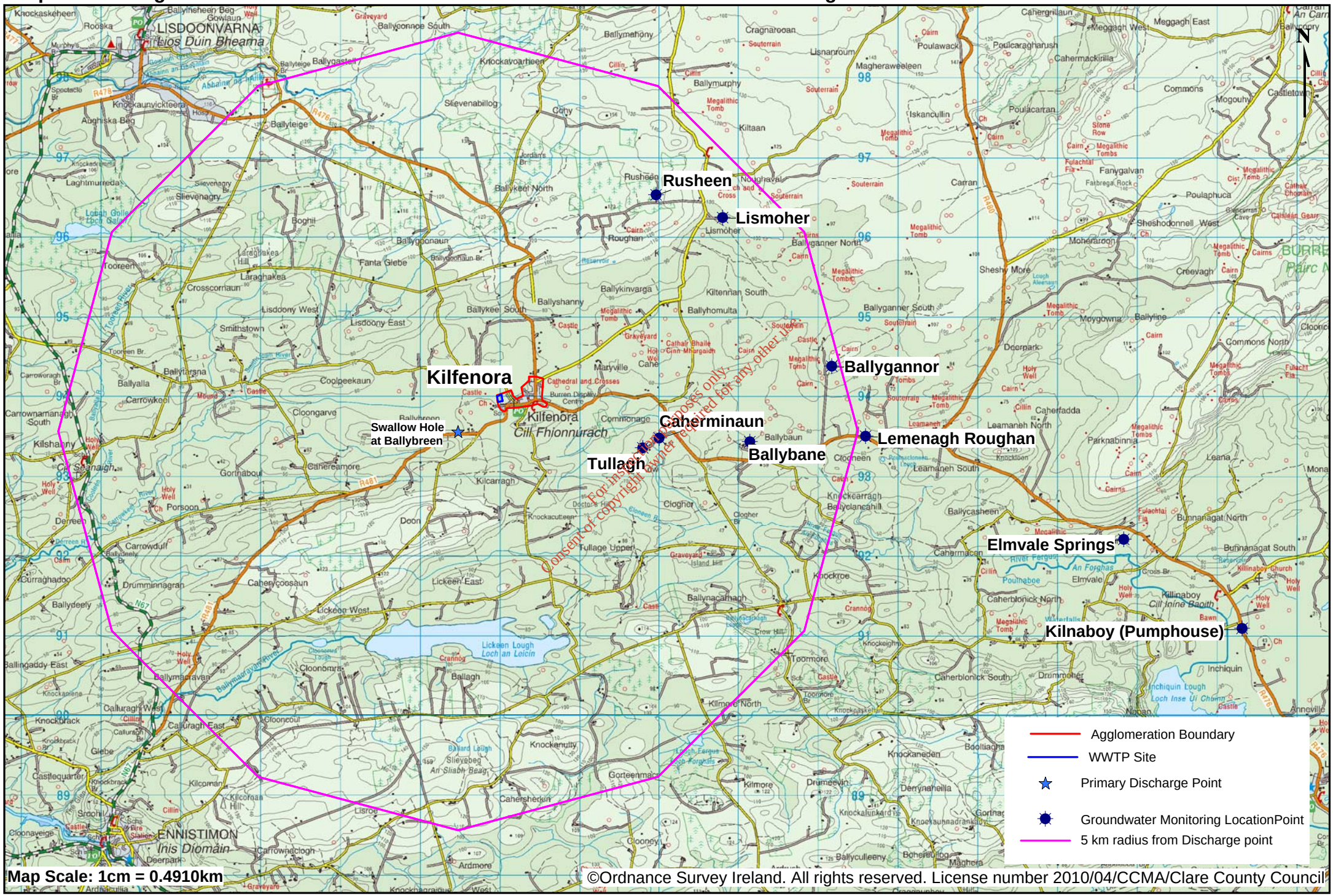
Groundwater TV[1:] Groundwater Threshold Value European Communities Environmental Objectives (Groundwater) Regulations, 2010

* Limit not listed

NT: Not tested

Map B3 showing location of Private Wells within 5Km of Kilfenora Waste Water Discharge Point

Version 2 October 2011



Map Scale: 1cm = 0.4910km

Attachment 1

Response to submission on Kilfenora WWTP Certificate Application

Prepared by: *Mary Burke, Senior Executive Chemist*

Submission from Michael Duffy on Kilfenora WWTP certificate application

Some errors in the submission on the licence application file have been highlighted in Mr. Duffy's submission, and these are addressed hereunder. However, the submission also deals with matters which cannot be addressed in this response. In so far as funding for upgrade of wastewater treatment facilities in the county (including the Kilfenora system) is concerned, this is a matter which is dealt with under the Water Services Investment Program, which is negotiated with the Department of the Environment. When funding is approved for a system, the system is provided (after the normal planning approvals etc have been addressed).

All applications submitted are required to deal with the system located at the site, describing its design and function. Many systems for which applications are made are in place for a period of time. With the benefit of hindsight we can see that there are areas which need to be addressed from an environmental perspective, and the licensing process is moving rapidly in this direction.

Source Protection Areas in County Clare, defined under the Groundwater Protection Plan

Numerous allegations are made in the third party submission, which have previously made to Clare County Council, and have previously been addressed in direct responses to Mr.. Duffy, when these matters were raised. It serves no purpose (other than "scandalous waste of resources" to use Mr.. Duffy's own words) to continually respond to these submissions. This applies to the comments made regarding County Clare's Groundwater Protection Plan, drawn up between 1996-1999. The plan involved bedrock mapping, sub-soil mapping etc to provide definitive vulnerability mapping for aquifers in the county. Included in this plan were three source protection areas- Newtown borehole (the former public supply source for Ballyvaughan), Drumcliffe (Ennis town public supply source) and Pouladower spring, located north west of Ballyallia, in the Fergus catchment. Pouladower was included to explore its potential viability as a public supply source. The catchment of Drumcliffe and Pouladower are quite separate, and have been shown to be so in repeated dye tracing exercises. Mr.. Duffy refers to Pouladower/Drumcliffe SPA. This should read Pouladower and Drumcliffe, and the reference to SPA is accurate only for Drumcliffe. When the Groundwater Protection Plan was put on display on the Geological Survey of Ireland (GSI) web site, the three source protection areas were shown on the public display maps. Clare County Council contacted GSI and advised that Pouladower was not a drinking water supply source, and requested an amendment to the public maps. Unfortunately, GSI removed both Drumcliffe and Pouladower maps from the web display. Clare County Council had to contact GSI again to request that the Drumcliffe map be placed on the web site. The Drumcliffe Spa was then put back on the GSI web site. Two distinctly separate plans exist for Drumcliffe and Pouladower, with distinctly different hydrogeological catchments. Both plans and maps are available.

Flow direction from Ballybreen Swallow Hole

Mr. Duffy's submission regarding the flow direction from Ballybreen swallow hole is correct. The dye tracing report, provided in the application as Attachment F.1.2 does indicate that the flow direction is to the Fergus catchment, emerging at Elmvale Spring, during low flow conditions. In high flow conditions, this flow is maintained to the Fergus catchment, with some flow being directed to the Cloongarve (Deelagh) catchment. The data was presented in the opposite scenario in the L8/08 assessment and the Appropriate Assessment. This is

corrected in a revised submission. However, the water quality data is unchanged and the conclusions reached in the assessment are unchanged. The water quality in the River Fergus system at Poplar Bridge and at the Elmvale Springs continues to be the yardstick used to assess the level of impact on water quality in the system. The groundwater monitoring program (which includes Elmvale Springs) is undertaken in September either on an annual or biannual basis. This reflects the lowest groundwater levels and should indicate maximum impact on groundwater. Monitoring of the River Fergus, at Poplar Bridge will include the impact of the Kilfenora discharge on surface water. In the assessment of impact submitted, the monitoring data for Poplar Bridge, and Elmvale Springs was included, and the data was assessed against the most recent statutory instrument defining water body status, namely EC Environmental Objectives (Surface Water) Regulations 2009 and EC Environmental Objectives (Ground Water) Regulations 2010.

Appropriate Assessment Amendment

The list of protected sites in the appropriate assessment is also extended on the basis of Mr.. Duffy's submission. A review of the Site Synopsis of the various designated sites was undertaken. This includes the following:

- River Shannon and River Fergus Estuary (Site Code 004077)
- Ballyallia Lake (Site Code 000014)
- Corofin Wetlands (Site Code 004220)
- Ballycullinan Lake (Site Code 000016)
- East Burren Complex (001926)
- Toonagh Estate (Site Code 002247)
- Inagh Estuary (Site Code 000036)

All of the above, with the exception of the Toonagh Estate (designated for the Lesser Horseshoe Bat and its foraging habitats) would be considered in the common context of impact on water quality. The conclusion regarding impact on the sites is unchanged, as the nearest point of impact assessment is the water quality at Poplar Bridge (Surface Water-River Fergus) and Elmvale Springs (Groundwater). A revised appropriate assessment is submitted to take account of the above list of sites.

Population Equivalent calculation

The estimation of population equivalent data for Kilfenora was presented in Attachment A1, Section 5. This indicates the various estimates of population. There is nothing to be gained in this exercise by making any additional comment on the submissions regarding this calculation.

WASTE WATER DISCHARGE LICENSING
APPROPRIATE ASSESSMENT for A0079-01 Version 2

1. Introduction

This "appropriate assessment" (AA) is undertaken in accordance with the Wastewater Discharge Authorisation Note on Appropriate Assessments, issued by the EPA. Due regard is given to the EC Guidance "Managing Natura 2000 Sites". In compliance with the requirements of Article 6 of the directive, and following the guidelines, this AA has been structured in stages as set out hereunder:

Stage 1 Screening:

This includes a description of the activity and the discharge; identification of the Natura 2000 sites potentially affected, identification of cumulative impacts on the Natura 2000 site in the vicinity of the discharge; assessment of the significance of the impacts identified on the site integrity

Stage 2 Appropriate Assessment

This includes a description of elements of the Natura 2000 site which will be considered further; a description of significant impacts on the conservation features of the site likely to occur from the discharge; and recommendations regarding necessary measures to be taken to ensure the protection of the site and its conservation objectives

Stage 3 Assessment of Alternatives

Following completion of the appropriate assessment, the competent authority must draw conclusions as to whether or not there are residual adverse effects on the designated site associated with the plan or project (after mitigation). If residual adverse effects are considered to be likely, alternative solutions are required to be considered. Conversely, if there are no residual adverse effects the consideration of alternatives is not required.

Stage 4 Assessment where no alternatives exist

This examines reasons (if they exist) of overriding public interest for continuation of a discharge which has a negative impact on the Natura 2000 site. The opinion of the European Commission is required if the project is considered on this basis.

2. Stage 1 Screening:

Is the Kilfenora WWTP directly connected with or necessary to the management of the site? No

2.1 Description of the treatment plant

The Kilfenora WWTP was constructed in 1974, and is located to the west of the village immediately north of the school. It is estimated to serve a population of 389 given current loadings. This PE is based on the Waste Water Discharge (Authorisation) Regulations, 2007; the calculation of population equivalent is based on the maximum average weekly flow entering the wastewater works during the year and measurement of organic biodegradable loads for this flow, allowing 60g of BOD_5 per head of population. A site layout map is provided in Attachment A to this assessment and a flow diagram of the Wastewater treatment Plant is provided in Attachment B to this assessment.

Kilfenora WWTP operates as an activated sludge process, with component elements as set out hereunder:

- Inlet screening and Balance Tank
- Storm Water Holding Tank
- Aeration tank
- Settlement tank
- Sludge Holding Tank
- Administration control house

Treated effluent is pumped via a 75mm rising main to the primary discharge point, Ref GW1, a Swallow Hole approximately 600m west of Kilfenora on the R476 Ennistymon Road in Ballybreen townland. Sludge arising on site is removed by tanker to Lisdoonvarna WWTP for further processing. The contractor removing this material is permitted under WCP/LK/222/07c. Daily record sheets with flow data and sludge handling details are maintained on site. In-process monitoring and final effluent monitoring is undertaken on a once per month basis at the plant, to provide appropriate control of the facility performance. The WWTP is manned by one part-time operative and an environmental technician on a part-time basis (Monday to Friday) and a part-time basis at the weekends.

The discharge from the facility is to groundwater in a karstified limestone catchment. Dye tracing on the discharge has been undertaken. The dye tracing study was provided with the certificate application. The conclusion of this exercise was that the discharge was generally emerging in the Fergus River, under low and normal water level conditions. During storm conditions a component of the discharge enters the River Dealagh catchment, with dye traces indicating an emergence of a portion of the discharge in the Cloongarve Stream included in the River Dealagh catchment.

2.2 Description of the protected sites

A full description of the protected sites is provided as Attachment C to this assessment. They include the following:

- Lower River Shannon SAC (Site Code002165)
- River Shannon and River Fergus Estuary (Site Code 004077)
- Ballyallia Lake (Site Code 000014)
- Corofin Wetlands (Site Code 004220)
- Ballycullinan Lake (Site Code 000016)
- East Burren Complex (001926)
- Toonagh Estate (Site Code 002247)
- Inagh Estuary (Site Code 000036)

All of the above, with the exception of the Toonagh Estate (designated for the Lesser Horseshoe Bat and its foraging habitats) are considered in the common context of impact on water quality.

The River Fergus is a designated surface water under the European Communities (Quality of Salmonid Waters) Regulations (S.I., 293 of 1988)

The River Fergus "*is a noted brown trout dry-fly river and a worthwhile spring salmon fishery in its lower reaches. The Fergus is said to produce about 200 salmon and grilse every year, though numbers of spring fish have declined in recent years*". (O'Reilly 2002) "*With a limestone base the river produces nice brown trout fishing with fish averaging about 1lb. Many fish of over 2lbs and larger are caught each year. Dry fly fishing is a very popular method with flies used as associated with rich limestone rivers. The best trout waters are up river of Ennis* (and) *on the lower stretches of the river particularly around the vicinity of Knox's Bridge.*" (www.shannon-fisheries-board.ie).

Under Conservation of Salmon and Sea Trout Bye Law No. C.C. 301, 2008 the River Fergus is closed for salmon and sea trout fishing in 2009.

While best known as a game fishery, the Fergus is also a coarse fishery. "*There is limited bream here which provides sport during the summer months. Rudd to specimen size feed freely in the summer. From mid May to September Tench fishing is good. The river also contains Perch and Pike, with winter Pike producing the best fish.*" (www.irishfishing.net)

2.3 Identification of potential impacts

Only those features of the operation of the wastewater treatment plant or the discharge, which have the potential to impact on interests and conservation objectives of the designated sites are considered. A number of factors were examined and then dismissed, or, carried forward for appropriate assessment, as relevant. The main issue examined in relation to potential impact on the designated sites was the water quality associated with the area downstream of the discharge from the WWTP and the

potential for the discharge to impact on the conservation status and protection of the Annex II species in the River Fergus.

The quality of the river water quality at Elmvale Springs and at the River Fergus Bridge downstream of Elmvale Springs has been examined to assess potential impact on water quality (and consequently the habitat of salmonid species) by reference to the EC Environmental Objectives (Surface Water) Regulations 2009, and the Directive 2006/44/EC of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (codified version). A copy of this assessment is provided as Attachment D to this Appropriate Assessment.
As no exceedence of limit values of the above named legislation were noted in River Fergus monitoring data surveyed, and no exceedence of limit values were noted for Elmvale Springs (by reference to EC Environmental Objectives (Groundwater) Regulations 2010, it was concluded that there was no discernible impact on either surface water or groundwater quality associated with the discharge from Kilfenora, and consequently no impact on the habitat supporting the salmonid species.

2.4 Elements of the project which (alone or in combination) with other plans or projects have the potential to have a significant effect on the site.

The discharge from the Kilfenora WWTP is made to groundwater, which has potential to recharge to surface water at Elmvale Springs, in the Upper River Fergus catchment. The River Fergus is a designated salmonid river, under the European Communities (Quality of Salmonid Waters) Regulations (S.I., 293 of 1988)

The discharge from the Kilfenora WWTP normally complies with the requirements of the Urban Waste Water Treatment Regulations 2001 &2004. Other discharges in the area which can be identified as having potential to have a significant effect on the site include

- Discharges to the River Fergus downstream of Elmvale Springs (Corofin WWTP)
- Diffuse discharges from agriculture in the River Fergus catchment

.
Other plans and projects considered to have potential to have “in combination” effects are listed hereunder:

- Clare County Development Plan (for which an appropriate assessment, as required under Article 6 of the Habitats Directive is being undertaken)
- North Clare Local Area Plan (for which an appropriate assessment, as required under Article 6 of the Habitats Directive is being undertaken)

- Downstream discharges to the rivers and lakes of the Fergus from dispersed rural housing, whose impact is included in the monitoring of Fergus and associated lakes

In so far as the impact of the combined discharges can be assessed by the water quality data recorded for the immediate catchment of the discharge (Elmvale Springs and Bridge on the Fergus downstream of Elmvale Springs, as provided in Attachment D to this report) there is no evidence of any compromised water quality in the area in the downstream catchment of the Kilfenora WWTP discharge or in combination with the existing discharges from developments. Development control measures and catchment surveys will continue to address the protection of the surface water and groundwater in the Fergus catchment, and conservation of the designated species associated with these waters.

2.5 Assessment of Significance of the discharge from the WWTP

The River Fergus is a designated salmonid river, under the European Communities (Quality of Salmonid Waters) Regulations (S.I., 293 of 1988). As there is no evidence of a significant impact from a water quality perspective in the downstream catchment of the River Fergus and this water quality is considered to be in the good to high status range, it is considered that there is no impact associated with the discharge on the designated species or habitats or spawning grounds of any designated species in the area

2.6 L8/08 Assessment

An assessment under L8/08 is provided as Attachment D to this document.

2.7 Conclusion

A screening process was undertaken to determine the potential impact, if any, of the Kilfenora WWTP discharge on the waters of the River Fergus, a designated salmonid river, under the European Communities (Quality of Salmonid Waters) Regulations (S.I., 293 of 1988). No impact linked to the discharge from the treatment plant is observed or considered likely on salmonid species, taking account of the effluent quality and the high status of the receiving waters downstream of the discharge.

3. Stage 2 Appropriate Assessment

3.1 Introduction

The potential impacts resulting from the effluent discharge from the Kilfenora WWTP are discussed in relation to the designation of the River Fergus as a salmonid water, and the designated status of salmonid species under the Habitats Directive
Any impacts (both positive and negative) on the species needs to be identified , and appropriate management planning needs to be in place to ensure the conservation and protection objectives for the species are met.

3.2 General Description

A full description of the protected sites is provided as Attachment C to this assessment. They include the following:

- Lower River Shannon SAC (Site Code002165)
- River Shannon and River Fergus Estuary SPA (Site Code 004077)
- Ballyallia Lake SAC (Site Code 000014)
- Corofin Wetlands SPA (Site Code 004220)
- Ballycullinan Lake SAC (Site Code 000016)
- East Burren Complex SAC (001926)
- Toonagh Estate SAC (Site Code 002247)
- Inagh Estuary SAC (Site Code 000036)

All of the above, with the exception of the Toonagh Estate (designated for the Lesser Horseshoe Bat and its foraging habitats) are considered in the common context of impact on water quality.

The River Fergus is a designated surface water under the European Communities (Quality of Salmonid Waters) Regulations (S.I., 293 of 1988)

The River Fergus "*is a noted brown trout dry-fly river and a worthwhile spring salmon fishery in its lower reaches. The Fergus is said to produce about 200 salmon and grilse every year, though numbers of spring fish have declined in recent years*". (O'Reilly 2002) "*With a limestone base the river produces nice brown trout fishing with fish averaging about 1lb. Many fish of over 2lbs and larger are caught each year. Dry fly fishing is a very popular method with flies used as associated with rich limestone rivers. The best trout waters are up river of Ennis* (and) *on the lower stretches of the river particularly around the vicinity of Knox's Bridge*." (www.shannon-fisheries-board.ie).

Under Conservation of Salmon and Sea Trout Bye Law No. C.C. 301, 2008 the River Fergus is closed for salmon and sea trout fishing in 2009.

While best known as a game fishery, the Fergus is also a coarse fishery. "*There is limited bream here which provides sport during the summer months. Rudd to specimen size feed freely in the summer. From mid May to September Tench fishing is*

good. The river also contains Perch and Pike, with winter Pike producing the best fish." (www.irishfishing.net)

3.3 Water Quality

Water quality monitoring has been undertaken by Clare County Council on a monthly basis at the main bridges of the River Fergus since the early 1980s, to address the protection and conservation of the salmonid habitat therein.

The main consideration regarding the impact of the discharge from the Kilfenora WWTP in relation to protection of the conservation status of salmonid species is to ensure the quality of the waters downstream of the discharge from the treatment plant are maintained at a status which would not impact on salmonid habitats, including their spawning grounds. This is achieved by ensuring the composition of the discharge does not give rise to an accumulation of any substance in the receiving waters liable to give rise to a reduction in water quality or any accumulation of any substance liable to damage salmonid habitats.

In this regard, the water quality (provided in Attachment D to this report) is assessed against the physico-chemical standards supporting good quality status for surface water as set out in the European Communities Environmental Objectives (Surface Water) Regulations 2009 and EC Environmental Objectives (Surface Water) Regulations 2009, and the Directive 2006/44/EC of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (codified version). As the water quality in the Fergus meets the standards required to protect "high" status defined in these Regulations, and no significant difference in water quality is detectable in the vicinity of the discharge, it is not considered that the discharge of treated wastewater from the Kilfenora WWTP adversely affects the salmonid status of the waters, or any associated habitats, both because of the quality of the discharge and the observed water quality in the system.

3.4 Other potential pollutants

A range of organic compounds with the potential to pollute surface waters are present in municipal wastewater from densely populated, industrial agglomerations. The sources of these chemicals are landfills, industrial effluents, medical products and personal hygiene chemicals. When municipal wastewater is treated in a conventional sewage treatment plant the average removal of these compounds is in the range 75-95%. There is no industrial component or landfill discharge or other source of organic pollution, or heavy metals in the Kilfenora agglomeration. When discharges from the Kilfenora WWTP were assessed against the limit values provided under the Dangerous Substances Regulations, no exceedence of these limit values was found.

3.5 Estimated impact of wastewater discharges from Kilfenora WWTP on receiving water quality

Water quality monitoring data for the River Fergus, (downstream of Elmvale Springs) and Elmvale Springs for the period 2008-2009 are included in Attachment D to this report. The data indicates water quality in the area is "high" or "good" when assessed against the values provided in the European Communities Environmental Objectives (Surface Waters) Regulations 2009

3.6 Analysis of in combination effects

The discharges from the Kilfenora WWTP and the diffuse discharges arising from the catchment of the River Fergus are taken into account in the assessment of water quality in the river, at the monitoring stations of the Upper Fergus. The study of water quality data, as described in Attachment D of this report, indicates that the operation of the Kilfenora WWTP in combination with other diffuse discharges in this catchment, is not having any adverse impact on water quality in the Fergus, or giving rise to damage to the salmonid habitat.

3.7 Mitigation Measures

The principal mitigation measure set out in the application is the ongoing management of the Kilfenora WWTP to ensure compliance with the Urban Waste Water Regulations 2001 and 2004, which provides primary, secondary and tertiary treatment of wastewater for this settlement.

The upgrading works on the discharge route will further reduce any potential for impact, by inclusion of tertiary treatment. This work is likely to be completed in 2012, pending funding approval from the DoEHLG. The treatment facility will include nutrient reduction to ensure low MRP levels in the final discharge and this is an additional mitigation measure in place at the facility

It is concluded that the discharge from the agglomeration of Kilfenora is not having a significant impact, (either in isolation or on a cumulative basis), on water quality in the River Fergus, as a salmonid habitat. This includes an impact on Annex II species and on the spawning grounds of these species.

4. Stage 3 Alternatives

The appropriate assessment presented has not identified adverse impacts associated with the project, or the project in combination with other projects on the receiving waters. Appropriate mitigation measures are in place to ensure that any potential adverse impacts are avoided through provision of appropriate infrastructure, management of the infrastructure and monitoring of the discharge from the treatment works, and of the receiving waters

5. Stage 4 Imperative Reasons of Overriding Public Interest

1. Are there imperative reasons of overriding public interest? **No**
2. Are there human health or safety considerations or important environmental benefits? **No**

WASTE WATER DISCHARGE LICENSING

Kilfenora L8/08 Assessment for Certificate Application A0079-01
Version 2

Assess the likelihood of significant effects of the wastewater discharges from the above agglomeration on the relevant European sites by referring to circular L8/08. In particular, the flow diagram in Appendix 1 should be completed and the results of each section recorded. If significant effects are likely then an appropriate assessment should be carried out and a report submitted to the Agency.

Referring to the L8/08 Circular, the following queries are raised and answered:

1. Is the development in or on the boundary of an SAC/NHA etc **No**
2. Will nationally protected species be directly impacted? **No**
3. Is the development a surface water discharge or downstream of a conservation site with water dependent qualifying habitats/species **No. The discharge is to groundwater, which is located in the catchment of the Fergus River. During high flow conditions the discharge also drains to the Cloongarve Stream, which is included in the River Dealagh catchment.**
4. Is the development a groundwater discharge/abstraction? **Discharge is to groundwater.**
5. Is the development in the surface water or groundwater catchment of salmonid waters? **Yes River Fergus catchment.**
6. Is the treatment plant in an active/former floodplain? **No.**
7. Is the development a surface water discharge to/from marine waters and within 3km of a marine conservations site? **No.**
8. Will the project in combination with other projects (existing and proposed) or changes to such projects affect the hydrology or water levels of sites of conservation interest or habitats of protected species? **No.**

L8/08 states that if the conclusion of the screening process above is to "Assess Impacts" then the project must be referred to the DEHLG Developments Application Unit. As the conclusion of the screening process is that there is no discernable impact, the application has not been referred to the DEHLG Developments Application Unit.

The quality of the river water quality at both Elmvale Springs and at the River Fergus Bridge downstream of Elmvale Springs has been examined to assess potential impact on water quality by reference to the European Communities Environmental Objectives (Surface Water) Regulations, 2009 and the European Communities Environmental Objectives (Ground Water) Regulations, 2010.

Monitoring data for Popular Bridge (River Fergus Station No 100) was examined for the period 2006-2009 and assessed against table 9 of the European Communities Environmental Objectives (Surface Water) Regulations, 2009. Arising from the assessment (using BOD, Dissolved Oxygen, total ammonia and molybdate reactive phosphate), the water quality generally presents as high status, with a full year of monitoring in 2009 presenting as high status.. The data for the years 2006 – 2009 is provided as Attachment 1 to this report.

Monitoring of groundwater in County Clare is undertaken at lowest water levels (generally late September or early October biannually). Elmvale Sprrings was monitored for the period 1997 – 2004. Data from this monitoring is collated and provided as Attachment 2 to this report. No exceedences of limit values prescribed under the European Communities Environmental Objectives (Ground Water) Regulations, 2010, Schedule 5, were noted in these monitoring events with one exception for the parameter Aluminium, when the Groundwater Threshold range was marginally exceeded at Elmvale Springs (152 µg/l Al was recorded as opposed to the Threshold Value of 150 µg/l Al).. As water levels were lowest during monitoring events, this presents the worst case scenario in terms of assessment of impact of discharges on groundwater quality. No discernable impact is noted at Elmvale Springs arising from the linkage between the discharge at Kilfenora and these springs.

Improvement works for the Kilfenora WWTP were described in the Certificate application (Attachment G.1). These works were the subject of a scheme upgrade to be funded under the Water Services Investment Programme (WSIP) 2007 - 2009.

The scheme to upgrade the Kilfenora WWTP was discontinued and the upgrade works at the WWTP are not included in the WSIP scheme for 2010 – 2012. There are no upgrade works is in progress at present. Any further works to upgrade the treatment plant will be determined by a priority assessment of needs in the county overall, and will take account of the current financial climate.

Waste Water Discharge Certificate of Authorisation for Kilfenora Agglomeration A0079-01

Flow chart from Appendix 1 of Circular L8/08 from DoEHLG

1. Is the development in a nature conservation site

↓ **No**

2b. (If the development involves a groundwater discharge) Is the development in the groundwater catchment or within 5km (whichever is the greater) of a nature conservation site (or part of such a site)?

↓ **No**

4. Is the development in the surface or groundwater catchment of other water dependent Annex II species, other rare or protected species or salmonid waters?

↓ **Yes**

Assess Impacts

Attachment 1 to Kilfenora FI A0079-01

Station Name	SampleDate	NH3-N	BOD	BOD (O2)	DO%	Nitrate (N)	Nitrite (N)	MRP	MRP-P	pH	TN	TON	TP	
Poplar Bridge - 0100	17/01/2007	<0.007	NT		104.7	1.84	0.015	0.043		6.9				
Poplar Bridge - 0100	14/02/2007	<0.007	<2		119	1.15	<0.013	0.026		8				
Poplar Bridge - 0100	14/03/2007	0.043	AR		117.8	0.95	<0.013	<0.009		7.6				
Poplar Bridge - 0100	11/04/2007	0.036	<2		112	0.58	0.036	0.04		7.4				
Poplar Bridge - 0100	16/05/2007	0.033	<2		123.8	1.22	<0.013	0.169		8.1				
95%ile		High	High		ok			High						
Poplar Bridge - 0100	08/10/2008	0.27		<2	NT	0.08	<0.001		0.035	7.59	<7	0.08	<0.1	
Poplar Bridge - 0100	12/11/2008	0.051		<2	NT	0.505	0.005		0.024	7.81	<7	0.51	<2	
Poplar Bridge - 0100	10/12/2008	<0.002		<2		<0.53	<0.00025		<0.001	7.75		0.53	<2	
95%ile				High										
Poplar Bridge - 0100	14/01/2009	0.082		<2		0.64	0.007		0.003	7.86	<7	0.65		2
Poplar Bridge - 0100	11/02/2009	0.009		<2	94.1	0.64	<0.0003		0.017	7.96	<7	0.63	<2	
Poplar Bridge - 0100	03/03/2009	0.033		<2	94.3	0.748	<0.0003		0.033	7.92	<7	0.746	<1	
Poplar Bridge - 0100	31/03/2009	0.038		<2	92.1	0.7	0.0028		0.032	7.82	<7	0.7	<1	
Poplar Bridge - 0100	11/05/2009	0.014		<2	109.8	0.465	0.002		0.046	7.9	<7	0.467	<0.1	
Poplar Bridge - 0100	29/09/2009	0.051		<2	81.8	1.49	0.0063		<0.001	7.56	<2	1.5	<0.02	
Poplar Bridge - 0100	16/12/2009	0.014		<2	85.6	0.46	<0.0025		0.014	7.85	<7	0.45	<0.1	
Poplar Bridge - 0100	27/10/2009	0.032		<2	89.2	0.66	<0.00025		0.065	7.94		0.66		
		High		High	ok				Mean=0.026					
									High					

Attachment 2 to Kilfenora FI A0079-01

Ground water results Parameter	Limit/Units	Elmvale Springs							Comparison with Schedule 5 SI 9/2010
		1997 **	1998**	Apr-00	Oct-01	Oct- 02	Apr-03	Nov-04	mg/litre
PH	>/=6.50 and </=9.5	–	–	–	–	–	7.42	7.48	
Conductivity	1,650 Us cm-1 25 oC	355	366	424	422	544	467	468	1875
Nitrate	50 mg/l NO_3	5.20	6.70	3.00	3.98	11.05	3.09	0.70	37.50
Nitrite	0.5 mg/l NO_2	<0.100	<0.100	0.01	<0.001	<0.001	0.021	0.003	0.375
Hardness	(MRC) 60 mg/l $CaCO_3$	170	189	193	240	298	246	NT	
Alkalinity	(MRC) 30 mg/l HCO_3	164	168	174	180	268	212	NT	
Fluoride	1 mg/l Fluoride	<0.250	<0.250	0.130	–	0.130	0.084	0.050	
OrthoPhosphate	0.03 mg/l -P	<0.50		0.04	0.02	0.04	<0.01	0.003	
Iron	0.2 mg/l Fe	0.300	0.210	0.150	0.210	0.060	<0.004	0.086	
Ammonium	0.3 mg/l NH_4	<0.01	<0.01	0.03	<0.03	0.1	<0.03	NT	0.065-0.175
Chloride	250 mg/l C1	19	21	32	18	22	28	NT	187.5
Coliform (total)	0 counts per 100 mls	300	42	60	–	27	10	Coliform Bacteria 308	
Coliform (faecal)	0 counts per 100 mls	250	10	10	–	30	0	E Coli 20	
Calcium	200 mg/L Ca	63	70	73	81	102	79	72	
Magnessium	50 mg/l Mg	3	3	4	4	5	4	<5	
Potassium	12 mg/l K	2.4	1.5	1.41	1.78	2.01	1.43	<5	
Sodium	200 mg/l Na	13	13	14	12	13	14	14	150
Sulphate	250 mg/l SO4	9	8	9	9	11	11	<20	188
Aluminium	200 ug/l Al	113	52	64	55	13	152	24	
Manganese	50 ug/l Mn	6	8	23	5	3	35	5	
Barium	500 ug/l Ba	12	14	11	11	15	11	<20	
Boron	1000 ug/l B	16	16	9	15	27	17	<100	750
Cadmium	5 ug/l Cd	<5.0	<5.0	0.3	0.4	0.3	<1.0	<0.5	
Chromium	50 ug/l Cr	<5	<5	0.5	0.8	3.5	<0.5	<5	
Copper	200 ug/l Cu	8	11	3	4	2	1	<20	
Lead	10 ug/l Pb	<20	<20	4	2	<2	<2	<2.5	
Mercury	1.0 ug/l Hg	<1	–	<0.008	<0.008	–	0.013	<0.015	
Nickel	20 ug/l Ni	10	<10	3	<3	<3	<3	<2	
Selenium	10 ug/L Se	<50	<50	<1	<1	<1	<1	2.1	

SITE SYNOPSIS

SITE NAME : LOWER RIVER SHANNON

SITE CODE : 002165

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 sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, 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, Glashacloonaraveela, 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.

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 Club-rushes (*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 Sea-spurrey (*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.

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 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.

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 over-grazing 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 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.

6.10.2006

Conservation Objectives for Lower River Shannon SAC [002165]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [1029] *Margaritifera margaritifera*
- [1095] *Petromyzon marinus*
- [1096] *Lampetra planeri*
- [1099] *Lampetra fluviatilis*
- [1106] *Salmo salar* (only in fresh water)
- [1110] Sandbanks which are slightly covered by sea water all the time
- [1130] Estuaries
- [1140] Mudflats and sandflats not covered by seawater at low tide
- [1150] * Coastal lagoons
- [1160] Large shallow inlets and bays
- [1170] Reefs
- [1220] Perennial vegetation of stony banks
- [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts
- [1310] *Salicornia* and other annuals colonizing mud and sand
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia* maritimae)

Citation:

NPWS (2011) Conservation objectives for Lower River Shannon SAC [002165]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

- [1349] *Tursiops truncatus*
- [1355] *Lutra lutra*
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
- [91E0] * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

SITE SYNOPSIS

SITE NAME: RIVER SHANNON AND RIVER FERGUS ESTUARIES SPA

SITE CODE: 004077

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 White-fronted Goose population but this declined during the 1980s and 1990s and the birds now appear appear to have abandoned the area. The site 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 Black-tailed 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.

1.4.2005

Conservation Objectives for River Shannon and River Fergus Estuaries SPA [004077]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [breeding & wintering] *Phalacrocorax carbo*
- [wintering] *Cygnus cygnus*
- [wintering] *Branta bernicla hrota*
- [wintering] *Tadorna tadorna*
- [wintering] *Anas penelope*
- [wintering] *Anas crecca*
- [wintering] *Anas acuta*
- [wintering] *Anas clypeata*
- [wintering] *Aythya marila*
- [wintering] *Charadrius hiaticula*
- [wintering] *Pluvialis apricaria*
- [wintering] *Pluvialis squatarola*
- [wintering] *Vanellus vanellus*

Citation:

NPWS (2011) Conservation objectives for River Shannon and River Fergus Estuaries SPA [004077]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

- [wintering] *Calidris canutus*
- [wintering] *Calidris alpina*
- [wintering] *Limosa limosa*
- [wintering] *Limosa lapponica*
- [wintering] *Numenius arquata*
- [wintering] *Tringa totanus*
- [wintering] *Tringa nebularia*
- [wintering] *Chroicocephalus ridibundus*
- [] Wetlands & Waterbirds

SITE SYNOPSIS

SITE NAME: BALLYALLIA LAKE

SITE CODE: 000014

Ballyallia Lake is a relatively small, shallow lake situated on the River Fergus approximately 4 km north of Ennis, Co. Clare. It is a naturally eutrophic lake, a habitat listed on Annex I of the EU Habitats Directive. The lake, which is base-rich with relatively clear water, is set amongst heavily farmed land to the north and south, with a low-lying flood plain of wet grassland and rough grazing to the west.

Habitat and species diversity around the lake is low and only a few emergent plants are found e.g. Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*). Lough Girroga, about 1 km to the south of Ballyallia, is included in the site. It is a small lake with a high diversity of vegetation communities and plant species. Here there is a well-developed reed fringe with a fen-like community of Great Fen-sedge (*Cladium mariscus*), Common Club-rush, Purple Moor-grass (*Molinia caerulea*) and the less common Black Bog-rush (*Schoenus nigricans*). A well-established Hazel (*Corylus avellana*) woodland slopes down to the northern lakeshore.

Ballyallia Lake is also a Special Protection Area for birds and a Wildfowl Sanctuary. The lake and the flood plain to the west hold nationally important numbers of Shoveler (120), Wigeon (1200), Coot (300), Mallard (600) and Gadwall (76). Significant numbers of Whooper Swan (80), an Annex I species under the Birds Directive, also use the site. Other regular wintering species include Teal (170), Lapwing (1100), Tufted Duck (188), Pintail (35) and Little Grebe (38) (all counts are maxima from 94/95 - 95/96).

Agricultural improvement to the lands surrounding the lakes in the site poses a significant threat to the water quality of the system.

20.11.1997

Conservation Objectives for Ballyallia Lake SAC [000014]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [3150] Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation

Citation:

NPWS (2011) Conservation objectives for Ballyallia Lake SAC [000014]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

SITE SYNOPSIS

SITE NAME: COROFIN WETLANDS SPA

SITE CODE: 004220

Corofin Wetlands SPA incorporates Inchiquin Lough, Lough Atedaun, Lough Cullaun and their associated calcareous wetlands. The site extends south-westwards to include the floodplain of the River Fergus to the west of Corofin, Co. Clare. The site contains some of the best areas of oligotrophic limestone wetlands to be found in the Burren.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Whooper Swan, Wigeon, Teal and Black-tailed Godwit. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the wetlands and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Corofin Wetlands SPA is of high ornithological importance for supporting nationally important numbers of Whooper Swan (127) and Black-tailed Godwit (329) - all figures are mean peaks for the five year period 1995/96 to 1999/2000. Nationally important populations of a further three waterbird species occur here, i.e. Little Grebe (87), Wigeon (2,828) and Teal (800).

Other species that occur include Mute Swan (223), Mallard (270), Gadwall (47), Shoveler (35), Tufted Duck (111), Coot (59), Golden Plover (56) and Curlew (222).

Corofin Wetlands SPA is of high ornithological importance and supports nationally important populations of five species: Little Grebe, Whooper Swan, Wigeon, Teal and Black-tailed Godwit. The regular presence of Whooper Swan and Golden Plover is of note as both species are listed on Annex I of the E.U. Birds Directive.

25.8.2010

Conservation Objectives for Corofin Wetlands SPA [004220]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [wintering] *Tachybaptus ruficollis*
- [wintering] *Cygnus cygnus*
- [wintering] *Anas penelope*
- [wintering] *Anas crecca*
- [wintering] *Limosa limosa*
- [] Wetlands & Waterbirds

Citation:

NPWS (2011) Conservation objectives for Corofin Wetlands SPA [004220]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Conservation Objectives for Corofin Wetlands SPA [004220]

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The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [wintering] *Tachybaptus ruficollis*
- [wintering] *Cygnus cygnus*
- [wintering] *Anas penelope*
- [wintering] *Anas crecca*
- [wintering] *Limosa limosa*
- [] Wetlands & Waterbirds

Citation:

NPWS (2011) Conservation objectives for Corofin Wetlands SPA [004220]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

SITE SYNOPSIS

SITE NAME: BALLYCULLINAN LAKE

SITE CODE: 000016

Ballycullinan Lake is a calcareous lake situated approximately 2 km south of Corrofin. The site includes a series of smaller lakes to the north-east of Ballycullinan, i.e. Cragmoher Lough, Drumcavan Lough and Shanvally Lough. Large reedbeds, sedge swamp, stands of Saw Sedge (Cladium mariscus) and fen surround these lakes. Limestone pavement and scrub woodland occupy the northern part of the site.

This site is a candidate SAC for *Cladium* fen, a habitat listed on Annex I of the EU Habitats Directive.

The area of open water is of particular interest for the presence of the alga *Cladophora sauteri*. This forms spherical aggregations that sometimes become buoyant and float. Otherwise they are found on marl or rocks on the lake bed.

The large areas of reedbed around the lakes are composed of Common Reed (*Phragmites australis*) and Saw Sedge. Behind them, Bottle Sedge (*Carex rostrata*) is frequent, growing in marl deposits with stoneworts (*Chara* spp.) and the moss (*Fontinalis antipyretica*). The adjacent marsh vegetation is characteristic of a limestone lake and contains Yellow Water-lily (*Nuphar lutea*), Water Plantain (*Alisma plantago-aquatica*), Lesser Spearwort (*Ranunculus flammula*), Water Mint (*Mentha aquatica*), Marsh Ragwort (*Senecio aquatica*), Tufted Forget-me-not (*Myosotis laxa* subsp. *caespitosa*), Greater Tussock-sedge (*Carex paniculata*), Water Dock (*Rumex hydrolapathum*) and the moss *Calliergon giganteum*.

In-flowing ditches allow Reed Canary-grass (*Phalaris arundinacea*), Brooklime (*Veronica beccabunga*), Yellow Iris (*Iris pseudacorus*) and Bog Stitchwort (*Stellaria alsine*) to colonise in places.

On sloping limestone pavement, Hazel (*Corylus avellana*) scrub is the dominant vegetation, with Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*) along with occasional Yew (*Taxus baccata*). The uncommon plant Dog's Mercury (Mercurialis perennis) occurs in scrub woodland in the northern part of the site. A species rich calcareous grassland occurs in mosaic with the limestone pavement.

The site is of conservation value for its range of calcareous wetland habitats, particularly for the presence of *Cladium* fen. The occurrence of limestone pavement adds greatly to the importance of the site.

20.03.2003

Conservation Objectives for Ballycullinan Lake SAC [000016]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

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The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

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- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [7210] * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*

Citation:

NPWS (2011) Conservation objectives for Ballycullinan Lake SAC [000016]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

SITE SYNOPSIS

SITE NAME: EAST BURREN COMPLEX

SITE CODE: 001926

This large site incorporates all of the high ground in the east Burren, and extends south-eastwards to include a complex of calcareous wetlands. The area encompasses a complete range of limestone habitats that include limestone pavement and associated calcareous grasslands and heath, scrub and woodland together with a network of calcareous lakes and turloughs. The site exhibits some of the best and most extensive areas of oligotrophic limestone wetlands to be found in the Burren and in Europe.

The limestone pavement includes smooth blocky and shattered types. The bare pavement is interspersed with species-rich calcareous vegetation communities. Typical grassland species found include Blue Moor-Grass (*Sesleria albicans*), Mountain Everlasting (*Antennaria dioica*), Bloody Cranesbill (*Geranium sanguineum*) and Wild Thyme (*Thymus praecox*). Limestone Heath is well developed in part of the uplands where Heather (*Calluna vulgaris*) and Bell Heather (*Erica cinerea*) are common along with St. John's-wort (*Hypericum* spp.) and Tormentil (*Potentilla erecta*). Two rare plant species which are common to this habitat include the Hoary Rock-rose (*Helianthemum canum*) and Pyramidal Bugle (*Ajuga pyramidalis*); both species are listed in the Red Data Book. To the south-east around the western shores of Lough Bunny an interesting heath community with Bearberry (*Arctostaphylos uva-ursi*) occurs at one of its few inland lowland locations in the Burren.

Caves are a feature of this site, with four known natural limestone caves showing a variety of formations and passage types. Vigo Cave has one of the best undisturbed cave entrance facies in Ireland and is considered a valuable karst heritage landform. Glencurrane Cave shows some fine phreatic solution features and one passageway, known as “Crinoid Tower” shows an abundance of crinoids which have been etched out by splashing water. Gortlecka Cave and a series of small caves above Lough Inchiquin are other fine examples of this habitat.

Ballyeighter Loughs complex to the east is a large network of calcareous lakes and turloughs with associated fen, cut-away bog and calcareous marsh habitats. The complex contains many species of plant and animal that are found in areas of fluctuating water levels. The fen flora is well developed and large areas of Great Fen-sedge (*Cladium mariscus*) and Black Bog-rush (*Schoenus nigricans*), with a diverse complement of associated species occur. Some of the best and most extensive calcareous swamp fen communities in the country occur within this complex and further north-east around the shores of Lough Bunny. Between this lake and the Coole-Garryland turlough complex to the north east of the site, another area of oligotrophic limestone wetlands occurs. This type of ecosystem is now very rare in

Europe and many of the habitats found are listed on Annex I of the EU Habitats Directive.

Many fine examples of turloughs occur within the site; Carran Turlough is an oligotrophic turlough *par excellence* with many interesting features in its flora and vegetation. It is rated as of international importance. Lough Atedaun is a good example of Burren wetland habitat. The aquatic plant communities are well developed and the rare, Red Data Book species, Mudwort (*Limosella aquatica*), occurs here.

Scrub cover is relatively good in this area of the Burren with large expanses of Hazel (*Corylus avellana*) intermixed with Spindle (*Euonymous europaeus*), Guelder Rose (*Viburnum opulus*) and Blackthorn (*Prunus spinosa*). An interesting scrub community of Alder Buckthorn (*Frangula alnus*), a Red Data Book species, Buckthorn (*Rhamnus catharticus*) and Shrubby Cinquefoil (*Potentilla fruticosa*), also a Red Data Book species, fringes the shores of some of the lakes and turloughs to the east.

Ballyeighter Wood to the east is an unusual scrub community on limestone with regenerating Oak (*Quercus* sp.) amongst Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*) and Hawthorn (*Crataegus monogyna*) and is an example of a woodland type that is rare in the Burren region. The eastern edge of Slieve Carran is dominated by steep cliffs and scree slopes over which Ash and Hazel wood is developed. This represents one of the few remaining woodland habitats in the Burren.

The East Burren Complex includes sites for many rare vascular plants and bryophytes (mosses and liverworts) and for several rare lichens and stoneworts.

In the east Burren wetlands Mute Swan and Whooper Swan occur in internationally important concentrations, while Wigeon, Lapwing, Dunlin, Black-tailed Godwit and Goldeneye are also very numerous. Also found in wetlands on the site (e.g. Lough Atedaun, Carran Turlough, Lough Aleenaun, Lough Inchiquin, Lough Bunny, Lough Cullaun, Muckanagh Lough) are Bewick's Swan, Teal, Mallard, Gadwall, Shoveler, Tufted Duck, Curlew, Golden Plover, Coot and Little Grebe. The site also supports a flock of Greenland White-fronted Geese. Several of these species are listed in the Red Data Book and on Annex I of the EU Birds Directive.

A nesting pair of Peregrine Falcon, a species listed on Annex I of the EU Birds Directive, occur on Glasgeivnagh Hill. The east Burren wetlands are frequented by Sparrowhawk, Kestrel and Hen Harrier, a rare species which is also listed on Annex I of the EU Birds Directive. Pine Marten and Otter have been recorded regularly within the site - both are listed in the Red Data Book as they are considered threatened in Europe, the latter also on Annex II of the EU Habitats Directive.

The site supports an internationally important population of Lesser Horseshoe Bats, with an estimated 400 individuals. There are two known nursery roosts, a transition roost and four known winter sites, the latter all in natural limestone caves. Pipistrelle and Long-eared Bats also occur. All of these species are listed in the Red Data Book,

the former also on Annex II of the EU Habitats Directive. The Lesser Horseshoe Bat is a small, delicate bat which is confined to six western counties, Mayo, Galway, Clare, Limerick, Kerry and Cork. It forages close to woodland and at the edges of water. The Irish population of this species is estimated to be about 12,000 individuals and may be the largest national population in Europe. The Pipistrelle Bat is the smallest bat to occur in Ireland and is the commonest and most widespread species. Pipistrelle Bats forage where small insects gather, in gardens, along hedgerows and trees, over ponds and along rivers. The Long-eared Bat is the second commonest bat in Ireland and is easily identified by its long ears which are nearly as long as its body. The Long-eared Bat forages in and along woodland where they glean insects off foliage. Since the bats moved into their present location, the roof has been replaced and timbers treated, but this does not seem to have disturbed the nursery colony. The surrounding habitat is ideal for the Lesser Horseshoe Bat's foraging habitat, being a mixture of lake, river, woodland and hedgerows. A number of small caves in the surrounding countryside raises the possibility of a nearby hibernation site. The bat colony is of international importance because of the numbers of Lesser Horseshoe Bats roosting there during the summer months and because of the close proximity of suitable foraging areas and potential hibernation sites.

The site includes a large population of Marsh Fritillary, a species of butterfly listed on Annex II of the EU Habitats Directive. The site also supports the only known populations of Slow Worm (*Anguis fragilis*) in Ireland - this lizard is believed to have been introduced in about 1970. Arctic Char (*Salvelinus alpinus*), a Red Data Book fish species has been recorded from Lough Inchiquin.

Most of the site is grazed by cattle and sheep, and in some areas, particularly the uplands, by goats. Slieve Carran is a Statutory Nature Reserve, while some 750 square km within the region of Mullaghmore makes up the Burren National Park.

Clearance and intensification of agriculture has caused damage to some parts of the site. This threatens the heath and scrub communities and may cause eutrophication (nutrient enrichment) of the lakelands to the east. Drainage and land reclamation have occurred in places around the edges of wetlands, while some marginal fen areas have been afforested. Areas of agriculturally-improved land have been included within the site in order to protect the hydrology and nutrient status of the wetland system.

The East Burren Complex is of international scientific interest owing to the presence of fine examples of typical Burren habitats together with an oligotrophic wetland complex of lakes, turloughs, fen, cut-over bog and calcareous marsh. The Ballyeighter complex represents an excellent example of a nutrient-poor calcareous lake and fen system, of European significance. The only remaining woodland habitats to be found in the Burren occur within the site. The site contains twelve habitats that are listed on Annex I of the EU Habitats Directive and three species of plant and animal listed on Annex II of this Directive and, as such, is of major conservation significance. The occurrence of many rare plants and several rare mammals within the site adds considerably to its scientific and conservation value. The site is of high ornithological interest for the internationally and nationally important numbers of waterfowl that use it.

03.09.2001

Conservation Objectives for East Burren Complex SAC [001926]

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- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [1065] *Euphydryas* (*Eurodryas, Hypodryas*) *aurinia*
- [1303] *Rhinolophus hipposideros*
- [1355] *Lutra lutra*
- [3140] Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
- [3180] * Turloughs
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- [4060] Alpine and Boreal heaths
- [5130] *Juniperus communis* formations on heaths or calcareous grasslands
- [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(* important orchid sites)
- [6510] Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)
- [7210] * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*
- [7220] * Petrifying springs with tufa formation (*Cratoneurion*)
- [7230] Alkaline fens

Citation:

NPWS (2011) Conservation objectives for East Burren Complex SAC [001926]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

- [8240] * Limestone pavements
- [8310] Caves not open to the public
- [91E0] * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

SITE SYNOPSIS

SITE NAME: TOONAGH ESTATE

SITE CODE: 002247

This site consists of part of a former estate 5km north-west of Ennis, County Clare. A stables provides a nursery roost for the Lesser Horseshoe Bat (*Rhinolophus hipposideros*), a species listed on Annex II of the EU Habitats Directive. The bats roost in the roof space and gain access through gaps in the lower sections of the building.

The population size has been increasing since the upper storey windows of the building were blocked. Approximately 100 individuals have been counted in recent years.

An area of parkland which contains some mature trees and hedgerows is included in the site as this provides ideal foraging habitat for the bats.

There are no immediate threats to this site.

27.9.2000

Conservation Objectives for Toonagh Estate SAC [002247]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

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The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [1303] *Rhinolophus hipposideros*

Citation:

NPWS (2011) Conservation objectives for Toonagh Estate SAC [002247]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

SITE SYNOPSIS

SITE NAME: INAGH RIVER ESTUARY

SITE CODE: 000036

The Inagh River Estuary is an estuarine channel that flows westwards to the sea from Ennistimon, in the southwest of Co. Clare. The site includes the estuaries of both the Inagh and Dealagh Rivers. These channels meander through a wide, flat valley, which is sheltered from the sea by an extensive sand dune system to the west. Low undulating hills surround the valley, giving it a secluded nature. The soils vary from gleys to peats.

A diverse mosaic of habitats occurs within the site, ranging from coastal dune system, estuarine channel and its associated saltmarsh habitat, to fresh water and terrestrial habitats further inland. The bulk of the site is made up of low-lying wet grasslands. The site holds examples of five habitat types listed under Annex I of the EU Habitats Directive.

Saltmarsh occurs along the tidal section of the valley. Common species here include a mixture of Plantains (*Plantago maritima*, *P. coronopus*) and Thrift (*Armeria maritima*), with lesser amounts of Sea Milkwort (*Glaux maritima*), Sea Aster (*Aster tripolium*) and Glassworts (*Salicornia* spp.). In places the Glassworts extend out onto the intertidal sands.

Owing to golf course development, only a small area of intact sand dune remains within the site. Some Marram (*Ammophila arenaria*) dunes occur at the tip of the sandy peninsula near O'Brien's Bridge. These support species such as Sand Sedge (*Carex arenaria*), Sand Couch (*Elymus farctus*), Red Fescue (*Festuca rubra*) and Sea Sandwort (*Honkenya peploides*). A small area of fixed dunes occurs north of the channel. The nutrient-poor soils here support a diverse flora which includes Birdsfoot Trefoil (*Lotus corniculatus*), Kidney Vetch (*Anthyllis vulneraria*), Quaking Grass (*Briza media*) and Early Marsh Orchid (*Dactylorhiza incarnata*).

Two small areas of deciduous woodland are found further inland towards Ennistimon town. A wet woodland, dominated by Willows (*Salix* spp.) and Downy Birch (*Betula pubescens*), occurs south of the river adjacent to Ivy Cottage. A narrow band of dry deciduous woodland, known as "The Glen", supports a mixture of Ash (*Fraxinus excelsior*) with occasional Oak (*Quercus* sp.) and Elm (*Ulmus* sp.). A scenic waterfall located at Ennistimon town adds to the interest and diversity of the site.

An expanse of wet grassland vegetation dominates much of the valley floor supporting an abundant cover of Rushes (*Juncus* spp.), along with lesser amounts of Sedges (*Carex* spp.), Plantains, Clover (*Trifolium* spp.), Buttercups (*Ranunculus* spp.) and Cuckooflower (*Cardamine pratensis*). These grasslands provide ideal feeding and sheltering grounds for wildfowl, and a range of bird species commonly use this area. A small flock of Greenland White-fronted Goose formerly used the site during

the winter months. The main waterfowl species now using the area are Wigeon (754), Teal (115), Mallard (67), Oystercatcher (148), Ringed Plover (53 I), Lapwing (657) and Curlew (211) (data for winters 1995/96 to 1997/98). Part of the site has been managed as a Wildfowl Sanctuary since 1989.

This is a large site with a range of coastal, tidal and terrestrial habitats that are of considerable ecological interest, five of which are listed under Annex I of the EU Habitats Directive. The extensive and relatively secluded low-lying wet grasslands provide a natural and legally protected refuge for wildfowl.

28.9.2000

Conservation Objectives for Inagh River Estuary SAC [000036]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

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- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [1310] *Salicornia* and other annuals colonizing mud and sand
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia* maritimae)
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [2120] Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")
- [2130] * Fixed coastal dunes with herbaceous vegetation ("grey dunes")

Citation:

NPWS (2011) Conservation objectives for Inagh River Estuary SAC [000036]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Clare County Council

Application for wastewater discharge licence for Kilfenora treatment plant

Non-Technical Summary

In accordance with Article 5 of Waste Water Discharge (Authorisation) Regulations, S.I. 684 of 2007

Version 2

Section A: Non-Technical Summary

1. Introduction

Clare County Council is required to make an application to the Environmental Protection Agency (EPA) for a Certificate Authorisation to discharge treated wastewater from the wastewater treatment plant (WWTP) at Kilcarragh, serving the Kilfenora agglomeration, in accordance with Article 5 of the *Wastewater Discharge (Authorisation) Regulations, 2007* (S.I. No. 684 of 2007), on or before the 22nd of December 2009. The application form and its attachments are completed as required by the EPA in accordance with guidance notes provided.

2. Description of Kilfenora

Kilfenora is located on the southernmost edge of the Burren, approximately 27 kilometres north-west of Ennis, 8 kilometres north-east of Ennistymon and 9 kilometres south-east of Lisdoonvarna on the R476. Kilfenora has only experienced small growth in housing development in recent years.

A map indicating an aerial view of the agglomeration catchment for Kilfenora, the location of the Kilfenora wastewater treatment plant, primary discharge and stormwater overflow points is provided as Attachment B-1.

3. Wastewater sources

Domestic wastewater is the main component of discharge to the Kilfenora wastewater treatment plant, which is located to the west of the village, with a proportion of commercial waste in the form of B&B facilities and small businesses. The majority of homes and businesses are served by the foul system. There is no industrial activity in the village.

4. The Wastewater Treatment Plant (WWTP)

The existing Kilfenora WWTP, which was constructed in 1974 is located to the west of the village immediately north of the school. The treatment process consists of an activated sludge process with final effluent from the treatment works site discharging directly to a swallow hole situated approximately 600m to the west of the village at Ballybreen. The existing Kilfenora WWTP is overloaded both in terms of the organic and hydraulic loads however proposals are in place to upgrade the WWTP on approval from the Department of Environment, Heritage

and Local Government. A site layout map of the wastewater treatment plant is provided in Attachment B.2.

5. Wastewater Flow volumes

The collection system serving the Kilfenora WWTP consists of combined foul and storm water collection system. Surface water infiltration has been identified as a major problem in Kilfenora, most likely from combined connections from individual premises. (*Ryan Hanley Preliminary Report Revised 2007*)

The estimated existing population for Kilfenora was calculated as 455 based on 2006 figures in the Ryan Hanley Revised Preliminary Report 2007, with a projected population of 704 for 2031. However this latter figure includes provision for a 30-bed hotel, for which planning permission has expired. If the population equivalent for the hotel is omitted from this calculation, the projected population for 2031 is reduced to 584. The above figures are based on previous definitions of population equivalent and dry weather flow, with 60grms BOD_5 and 225 litres flow per head per day.

When flow data for the Kilfenora WWTP for the year 2008 was examined, the average approximate hydraulic loading arriving at the Kilfenora WWTP is 238m^3/day. Flows entering the WWTP ranged from a maximum of 911m^3/day observed in November 2008 to a minimum of 52m^3/day observed in April 2008. When these measurements are used to estimate the final population equivalent, based on the average influent BOD values for 2008 of 98mg O_2/litre BOD, the population equivalent is 389 PE. This approach to estimation of population equivalent is in accordance with the definition provided in the Waste Water Discharge (Authorisation) Regulations, 2007 (“*population equivalent” is a measurement of organic biodegradable load and a population equivalent of 1 (1 p.e.) means the organic biodegradable load having a five-day biochemical oxygen demand (BOD_5) of 60g of oxygen per day; the load being calculated on the basis of the maximum average weekly load entering the waste water works during the year, excluding unusual situations such as those due to heavy rain*).

6. Storm overflows

A storm overflow facility is provided at Kilfenora WWTP. The storm overflow facility discharges to a Swallow Hole located along the northern perimeter of the WWTP. A new storm water holding tank has been installed to provide 10 hours storage capacity at 3 times DWF. The holding tank has sufficient capacity to hold

the storm water, which is then redirected back through the WWTP hence the storm water overflow facility operates under extreme emergency conditions only.

7. Impact of emissions from the Kilfenora WWTP

Effluent from the treatment works site discharges directly to a swallow hole situated approximately 600m to the west of the village at Ballybreen. Studies by Drew[1], indicate that the swallow hole is located on the underground watershed of Hydrometric Areas 27 and 28. At low flows the water from the swallow hole drains east to springs feeding the upper portion of the River Fergus. During high flows the water continues to drain to the same springs at flow rates of 150-300m^3/h but in addition some swallow hole flows drains at a flow rate of 150m^3/h to the Cloongarve Stream to the west, which is a tributary of the Smithstown River and included in the River Dealagh catchment, ultimately draining to the Inagh River and Liscannor Bay.

The existing Kilfenora WWTP is overloaded both in terms of the organic and hydraulic loads. The nutrient discharge load over the period 2007 – 2009, based on the estimated average flow readings and mean analytical values for the dates presented, is described in Attachment F.1. While exceedances of the Urban Waste Water Treatment Regulations, 2001 (S.I. No. 254 of 2001) as amended by the 2004 Regulations, (S.I. No. 440 of 2004) were observed in the discharge from Kilfenora WWTP, there is compliance of the mean analytical values when reference is made to the Fifth Schedule of the Regulations as detailed in Attachment F.1.

As the discharge from the Kilfenora WWTP is directly to groundwater, a sample of the receiving waters could not be taken in the preparation of this application. However taking account that the major flow from the Ballybreen swallow hole drains east to the springs feeding the upper portion of the River Fergus, an assessment of water quality at known water abstraction points (private water potable supplies) downstream of the discharge point at Ballybreen and of the water quality in the upper regions of the River Fergus was made to reflect any impact on the receiving waters.

Water quality in private water supplies within a 5Km radius downstream of the discharge is assessed having regard to the European Communities Environmental Objectives (Groundwater) Regulations, 2010. Also included in this assessment is

water quality data from Groundwater monitoring at Elmvale Springs and Kilnaboy (Pumphouse). Both of these monitoring locations are situated over 10km downstream of the Ballybreen swallowhole. The results indicate compliance with the requirements of the European Communities Environmental Objectives (Groundwater) Regulations, 2010, with one exceedance noted for the parameter Aluminium, when the Groundwater Threshold range was marginally exceeded at Elmvale Springs (152µg/l Al was recorded as opposed to the Threshold Value of 150 µg/l Al). The results do not indicate a significant impact from the discharge on groundwater quality. A map showing the location of the private water supplies is provided in Attachment B.3 V.2.

Similarly results of analysis of the upper reaches of the River Fergus at Popular Bridge (Code 0100), Riverstown Bridge (Code 0200) and Corrofin Bridge (Code 0300) show compliance with the Schedule 5 criteria for Calculating Surface Water Ecological Status and Ecological Potential, Table 9 - Physio-Chemical Conditions Supporting the Biological Elements of the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 as outlined in Attachment F1.1. Exceedances of the requirements were observed for the parameter Dissolved Oxygen at all three bridges during April and May 2007, and these exceedances may be attributed to increased vegetation and warm weather conditions at the time of analysis. Additionally one exceedance was observed for the parameter Ortho-Phosphate in May 2007 and it is considered that the elevated result is associated with increased vegetation immediately upstream of the site.

Recent biological monitoring carried out by Conservation Services on behalf of Clare County Council indicates that all three sites are classified with a Q value of 3-4 as outlined in Table 1 in Attachment F.1. The overall interim water quality status for the Upper River Fergus Catchment has been classified by the EPA as good.

The storm overflow facility at Kilfenora WWTP discharges to a shallow Swallow Hole located along the northern perimeter of the WWTP site. As a result of the construction of the new stormwater holding tank at the WWTP, the overflow facility operates in extreme emergency conditions only, thus the impact on the receiving groundwaters from this discharge is minimal.

8. Proposed technology for improving emissions from WWTP

At the time of the application preparation the discharge from the Kilfenora WWTP was the subject of a scheme upgrade to be funded under the Water Services Investment Programme (WSIP) 2007 - 2009.

The proposals in the preliminary report, issued in 2007, and which had been forwarded to the Department of Environment, Heritage and Local Government, recommended the upgrade of the WWTP, and included provision of tertiary treatment in the form of a constructed percolation area which would permit flows from the WWTP to percolate indirectly to groundwater.

The scheme to upgrade the Kilfenora WWTP was discontinued and the upgrade works at the WWTP are not included in the WSIP scheme for 2010 – 2012. There are no upgrade works is in progress at present. Any further works to upgrade the treatment plant will be determined by a priority assessment of needs in the county overall, and will take account of the current financial climate.

9. Measures planned to monitor emissions into the environment

Provisions for monitoring emissions from the wastewater treatment plant are in place at the Kilfenora WWTP. A full time laboratory technician is employed to cater for the operational requirements in terms of monitoring at the Kilfenora wastewater treatment plant. Monitoring of influent and effluent wastewater streams is undertaken monthly for the parameters biochemical oxygen demand (BOD), chemical oxygen demand (COD) and suspended solids (SS).

Methods of analysis and sampling procedures are provided in Attachment E.2 of this application. Sampling is currently undertaken as a grab sample for both the influent and effluent streams.