Clare County Council

Application for wastewater discharge licence for Inagh treatment plant

Non-technical summary

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

Section A: Non-technical summary

1. Introduction

Clare County Council is required to make an application to the Environmental Protection Agency (EPA) for a licence to discharge treated wastewater from the wastewater treatment plant (WWTP) at Carrowkeel West, serving the Inagh village 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 June 2009. The application form and its attachments are completed as required by the EPA in accordance with guidance notes provided.

2. Description of Inagh Agglomeration

Inagh is located in north Clare approximately 17 kilometres west of Ennis on the N85. Inagh has experienced an increase in housing development in recent years and is identified for controlled settlement growth.

A map indicating the catchment served by the Inagh plant, the location of the Inagh wastewater treatment plant, and the pumping stations is provided as Attachment B.1.

There are two pumping stations serving the foul network, which are located at Church Yard and Miltown Road.

3. Wastewater sources

Domestic wastewater is the main component of discharge to the Inagh wastewater treatment plant, with a small proportion of commercial/non-domestic discharge. There is no industrial activity in the village. The design population for the Inagh WWTP is 550 PE, however the WWTP is estimated to serve a population of 273 given current loadings as outlined in Table 1 below. The current and projected population demand was assessed in the Land Serviced Initiative Sewerage Scheme Preliminary Report, carried out by RPS Consultant Engineers in March 2008. The details of the domestic demand and projected agglomeration loading is provided in Attachment A.5 to this application.

4. The Wastewater Treatment Plant (WWTP)

The Inagh WWTP was constructed in 1995/1996, and is located to the north-west of the village adjacent the River Inagh. The design population for the Inagh WWTP is 550 PE, however the WWTP is estimated to serve a population of 273 given current loadings as outlined in Table 1 hereunder: Prior to the construction of the existing foul network, the school and local authority housing were served by a combined network, which directed flows to a number of septic tanks in the area. The access route to the plant is from the Miltown Road, via a lay-by situated adjacent to the local supermarket shop.

Table 1: Design data for Inagh WWTP

Design Load	273
DWF	140 m^3/day
BOD_5 Load	16.4 kg/day

The above design was based on previous definitions of population equivalent and dry weather flow, with 60grms BOD_5 and 225 litres flow per head per day. Under 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 load for this flow, allowing 60g of BOD_5 per head of population.

5. Treatment Process Description

Inagh WWTP operates as an extended aeration activated sludge process, and consists of the following elements:

- Inlet Pump House
- Inlet screening, fitted with screening removal and bypass
- Aeration tank fitted with open vane surface aerators
- Clarifier
- Sludge belt press
- Administration control house

5.1 Inlet pump houses.

The eastern section of Inagh village is served by the Church Yard pumping station and is located approximately 300 metres to the south-east of the treatment works. A 100mm rising main from this station delivers flow directly to the Inagh WWTP. Two submersible pumps are provided in the pumping station, operating on a duty/standby basis and with design pumping capacities of 10.5 and 12.1 litres/second. An overflow pipe discharges to the River Inagh in emergency situations. This wastewater discharge is a secondary discharge and is designated SW2 on the maps accompanying the application. Proposals are in place at present under the Land Serviced Initiative scheme, to replace the existing pumping station at Church yard and increase the storage capacity to $50m^3$. A back up generator would also be provided and the overflow eliminated.

The Miltown Road pumping station serving housing developments to the west of Inagh has two submersible pumps with design pumping capacities of 8.5 and 8litres/second. There is no overflow facility at this pumping station, which is designated SW3 on the maps accompanying the application.

The locations of the pumping stations are indicated on the Map Attachment B-1 to this application.

5.2 Inlet Screening

Incoming wastewater is directed through coarse bar screens to remove solids or alternatively a screen bypass is provided to divert overflow directly to the aeration basin. The screenings are removed manually.

5.3 Aeration Basin.

The single aeration tank is a flat-bottomed tank, with a reactor volume of $157m^3$. Aeration is provided by mear blade impeller and an under aerator baffle. This should provide a retention time of

1.12 days (25 hours). Two 600mm overflow weir penstocks direct flow to the two clarifiers.

5.5 Clarifier

There are two imhoff type clarifier tanks of 21m^3 capacity in place. The clarifiers incorporate a diffusion box, baffle plate and castellated weir plates. The final clarified effluent discharges directly via an 225mm diameter concrete pipeline to the River Inagh.

A site layout map is provided as Attachment B-2 and the map indicating both the location of the treatment plant and the main discharge point to surface water is provided as Attachment B-1. The treated wastewater discharge is the primary discharge, and is designated SW1 on the maps accompanying the application. There is no storm water overflow facility from the Inagh WWTP. (See photographs of the location of the plant, including the location of outfalls to surface waters, Attachment A.3)

5.7 Sludge Management

Settled sludge is drawn from the bottom of the clarifiers into the sludge processing system. Sludge can either be returned to aeration tank or transferred to the sludge treatment building. The waste sludge is processed mechanically via a "Solids Technology" belt press and screw conveyor and associated sludge thickening (using poly) equipment before being removed off site. Sludge is taken to McGill Environmental Systems (Irl) Ltd., Co. Cork for composting. The contractor removing this material is permitted under WCP/LK/047/026 WCP/LK/047/07c.

5.8 Administration Control House

The control room is housed in the administration building on site. The control room houses the main control panel for the treatment plant monitoring pumps and recording systems and basic office facilities provided therein. 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.

6. Wastewater Flow volumes

The collection system serving the Inagh WWTP consists mainly of partially separate sewers with a small section of separate storm-water drainage thus storm-water infiltration to the system is likely to be an ongoing feature of the hydraulic loading to the system.

Flow records for the year 2008 have been examined. The flows recorded for the year 2008 are provided in Attachment E-1. Based on influent BOD measurement, this provides a population equivalent of 273. The total hydraulic load arriving at the Inagh WWTP was calculated by measurement of the average flow for the year 2008, and this measurement was used to estimate the final population equivalent, based on the average influent BOD values in 2007/2008. The estimated flow value arriving at the treatment works is 140m^3 per day, with an average BOD of 117 mg O_2/litre. The population equivalent for this loading is 273. 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).

7. Combined storm overflows

A storm overflow facility is provided at the Church Yard pumping station, delivering wastewater flow to the Inagh treatment plant. The storm overflow facility at Church Yard discharges to the River Inagh just south of the bridge. Samples of the river were taken during the preparation of this application and results of this exercise are set out in Table F.1 (ii) a of the application form.

8. Impact of emissions from the Inagh WWTP on the Inagh River

The impact of discharges from the Inagh WWTP on the receiving waters of
The Inagh River is considered under a number of headings:

8.1 Description of receiving waters
8.2 Statutory Designations of the Receiving Waters
8.3 Assimilative capacity of the receiving waters
8.4 Total maximum nutrient load discharging to receiving waters
8.5 Monitoring undertaken on receiving waters
8.6 Impact of storm overflows

8.1 Description of receiving waters

The Inagh WWTP discharges to the River Inagh, which is included in the catchment of the Shannon River Basin and in the EPA hydrometric and biological monitoring programs (Code 28I01). The river rises in the foothills of Slieve Callan and drains into the River Inagh Estuary, which is a Special Area of Conservation (SAC) (Code 000036) at Ennistymon. The river is approximately 30 kilometres long and has a catchment area of 168 km^2. The upper reaches of the catchment comprise primarily of peat bogs, coniferous forest and woodland scrub while the lower regions are well draining agricultural lands. The Inagh catchment area includes a number of main tributary rivers, namely the Aughaglanna River (Code 28A06) which drains into the Inagh River upstream of the Inagh, the Aillenabrockagh River (Code 28_631) which flows in a westerly direction and drains into the Inagh River downstream of Inagh and a third main tributary (Code 28_87) which flows in an easterly direction draining into Drumcullaun Lough before draining into the Inagh River.

The nearest downstream abstraction point of water for potable supply is a private Groundwater supply at Russ Hill (G97/2) approximately 6.4 kilometers away and a second private Groundwater supply at Lavereen, which is approximately 8.3 kilometres away. A public water supply abstraction point at Lough Keagh (CW22), is located approximately 10 kilometres on the western boundary of the catchment.

The river water quality at both the Bridge at Inagh (Site No. 0200) and at Monanagh Bridge (Site No. 0300) are classified with a Q value of 3-4 in the most recent monitoring conducted in 2007 as outlined in Table 2 below. The overall interim water quality status for the Inagh Catchment has been classified by the EPA as Good, with the exception of the immediate sub-catchment areas to the east, south-east and north-east of Inagh, which have been classified as High water quality status.

Table 2River Inagh Monitoring 1985 – 2007

	EPA						CS		
Site No	**1985**	**1988**	**1991**	**1997**	**2000**	**2003**	**2005**	**2006**	**2007**
0100	5	4-5	4-5	5	4-5	4	4-5	5	-
0200	5	4-5	4	4	4	4	4	3-4	3-4
0250	-	3-4	4	-	-	-	-	-	-
0300	4-5	4	4	4	4	4	3-4	3-4	3-4
0450	-	-	-	4	3	4	3-4	4	-

EPA: Environmental Protection Agency; CS: Conservation Services

8.2 Statutory designations of the Inagh River

There are no sites designated as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) or Natural Heritage Areas (NHAs) in the vicinity of the Inagh WWTP.

8.3 Assimilative capacity of receiving waters

Estimates of total effluent discharge volumes and associated nutrient loads are used to assess the likely impact of the discharge from the Inagh WWTP on the River Inagh water quality. The full assimilative capacity calculation is provided in Attachment A-8 to this application in a report by Bord na Móna Technical Services dated August 2007.

The baseline water quality of the River Inagh, as assessed by Bord na Móna Technical Services over the 2007 summer period, both upstream and downstream of the existing wastewater treatment plant discharge, is of good quality with the majority of parameters within their respective limits.

With regard to orthophosphates, the indicative assimilative capacity calculations based on flows on the 11th July 2007 i.e. 56,937m^3/day, and on an increase in the specification standard of treatment, shows that orthophosphate concentrations would increase from 0.01mg/l to 0.016mg/l, which would result in the waters remaining unpolluted under the Phosphorus Regulations. However under the calculated low flow conditions, the orthophosphates would increase from 0.01 to 0.07mg/l, which equates to going from unpolluted to moderately polluted waters. All other parameters would remain within their respective EQS's for surface waters. The historical database of physio-chemical water quality for orthophosphates for the Inagh River is up to January 2005. The most recent set of results in accordance with the Third Schedule of the Phosphorus Regulations, shows the median orthophosphate concentration as being 0.01mg/l, which is consistent with results obtained during the four sampling events carried out for this study. A summary calculation shows that the Inagh River would be able to assimilate a discharge of 720 P.E. in low flow conditions without causing a decline in water quality above the new proposed EQS for orthophosphates in surface waters. There are two sets of data for the 95%ile flow conditions of the Inagh River at Ennistymon. Because of this uncertainty, a low flow based on 1l/sec/km^2 of catchment area for the calculation of the assimilative capacity was used.

The existing discharge at the Inagh WWTP will be subject to a schedule of improvement works, which will include upgrading and refurbishment to provide for increased capacity from new developments in the Inagh agglomeration.

8.4 Total maximum nutrient load discharging to the Inagh River

Analytical data for the wastewater discharge from the Inagh WWTP is available of the effluent streams over several years. The influent and effluent streams are monitored for biochemical oxygen demand (BOD), chemical oxygen demand (COD), and suspended solids (SS). Results for 2007 and 2008 are used for this application.

Flow data for the influent load to the plant is recorded monthly. These flow records indicate the range of flow volumes through the system is 78 - 225 m^3/day, however much higher flow data hav been recorded on occasion during heavy rainfall episodes. The calculation of discharge load uses the average flow data readings over the period January to December 2008 to present the typical discharge load from the facility. This approach takes account of the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007 in relation to calculation of population equivalent, *"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* - 16 - *biochemical oxygen demand (BOD5) 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"*

The discharge of the treated waste stream is used to assess the impact of the discharge on the receiving waters for biochemical oxygen demand (BOD) chemical oxygen demand (COD) and suspended solids (SS) to waters. The nutrient discharge load is synopsised in Table 2, based on the estimated maximum flow readings and mean analytical values for the dates presented.

Table 2: Estimated nutrient load from Inagh WWTP to the Inagh River

Date	*BOD (kg/day)*	*COD (kg/day)*	*SS (kg/day)*
16/01/2008	0.3	2.2	1.1
25/03/2008	0.3	3.1	0.6
21/04/2008	7.4	17.4	8.5
29/05/2008	1.3	1.5	1.1
18/06/2008	0.8	3.5	1.4
01/07/2008	2.2	5.6	2.1
16/09/2008	3.6	8.7	4.2
14/10/2008	1.8	3.1	0.3
Average	2.2	5.6	2.4

Average flow = 140m^3/day; SS; suspended solids; BOD: biochemical oxygen demand; COD: chemical oxygen demand;

8.5 Monitoring undertaken on receiving waters

Physio-chemical monitoring of the Inagh River commenced in April 2007 in accordance with the WFD Monitoring Programme, at a site along the N85 approximately 750metres downstream of the bridge at Inagh (Station No. 0210) and at Monanagh Bridge (Station No. 0300). The results indicate compliance with the proposed EQSs for Good Status Sites with the exception of the results for the parameter BOD - (Good Status ≤1.5(mean) or ≤2.6 (95%percentile)) and for Ammonia (Good Status ≤0.065(mean) or ≤0.140 (95%percentile)) at the sampling point immediately downstream of the WWTP (Site No. 0210). It is noted however that the overall interim water quality status as classified by the EPA, is Good status downstream of the WWTP.

The median MRP values for waters in the Phosphorus Regulations are correlated with biological quality ratings, or Q values. The results also show compliance with Q5 (Class A) or unpolluted water quality with the standard defined for molybdate reactive phosphate (MRP) under the *Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus Regulations) S.I. 258 of 1998.* The median MRP concentration for the Site No.0210 Bridge on N85 750m downstream of the outfall from the Inagh WWTP is 0.015mg/litre. Similarly at Monanagh Bridge Site No. 0300, the median MRP concentration is 0.012mg/litre.

Biological quality monitoring (Q rating) in accordance with the *Local Government (Water Pollution) Act 1977 Water Quality Standards for Phosphorous Regulations, 1998* is undertaken on a national basis by the E.P.A. Clare County Council also commission Conservation Services to undertake biological monitoring of surface waters. The most recent Q-values recorded in 2007, Q3-4, have not changed from the previous monitoring in 2006 for the site at Monanagh Bridge (Site No. 0300).

Clare County Council, during the course of preparing the application for a discharge authorisation**,** under the *Wastewater Discharge (Authorisation) Regulations 2007, (S.I No 684 of 2007)* for the Inagh WWTP, to the EPA assessed the Inagh agglomeration to identify any facility liable to generate substances listed in Annex X of the Water Framework Directive (2000/60/EC) or relevant pollutants listed in Annex VIII of the Water Framework Directive. Monitoring for these substances was undertaken in April 2009 and results on this monitoring do not indicate any substance on the list was present in the waters of the Inagh River or in the discharges to the river from the Inagh WWTP, with the exception for the parameters Toluene and Xylenes, which have elevated levels in the ambient downstream sample from the Inagh WWTP (see Attachment F.1). No potential source of these pollutants has been identified in the sewer catchment, and the source of the listed substances in the ambient downstream sample is unclear. The substances were not observed in the discharge sample. Results from the survey will be collated and included in the licence application data as soon as may be on receipt of the results of the sampling exercise.

The monitoring programs described above provide a good overview of the water quality status in the Inagh River, both upstream and downstream of the WWTP discharge. The quality of the existing discharge and associated nutrient loads present a limited risk of pollution to water quality in the Inagh River. Any increase in the Inagh agglomeration will be restricted unless the proposed Land Serviced Initiative Scheme and associated upgrading and refurbishment of the Inagh WWTP are implemented. These proposals will cater for an increased loading of up to 1850 PE over a projected 25 year period. The Council has already acquired lands adjacent to the existing WWTP for the proposed upgrading of the treatment works and a Part VIII planning application was lodged with the Planning Department in 2008. In March 2009, approval was given to proceed with the development. In conclusion, there is no indication of significant deterioration in quality status of the Inagh River downstream of the discharge from the treatment plant.

8.6 Impact of storm overflows

A storm overflow is located at the Church Yard pumping station. During long periods of pump dysfunction, or power outages, the configuration at the pumping stations is such that there is potential for overflow from the system. Normal operations of the unit, even during heavy rainfall do not result in overflow. Any such overflow discharges to the River Inagh just south of Inagh Bridge. Sampling of this drain was undertaken on April 14th 2009, during the course of preparing the licence application.

Results from the survey will be collated and included in the licence application data as soon as may be on receipt of the results of the sampling exercise. No complaints have arisen in connection with this overflow.
Proposals are in place at present under the Land Serviced Initiative scheme, to replace the existing pumping station at Church yard and increase the storage capacity to 50m^3. A back up generator would also be provided and the overflow eliminated.
There is no storm overflow from the pumping station on the Miltown Road.

9. Proposed technology for improving emissions from WWTP

Pursuant to Clare County Council's Water Services Investment Programme 2007-2009 Clare County Council are proposing the expansion and upgrading of the wastewater treatment facilities for the Inagh WWTP and associated pumping stations stations, to cater for the projected loading arising in the agglomeration. A Preliminary Report was carried out by consultants RPS in March 2008 and is with the Department Of Environment Heritage & Local Government for comment. A Part VIII planning application was lodged with the Planning Department in 2008. In March 2009, approval was given to proceed with the development. Initial proposals for the phase 1 development had a completion date of 2010, however a scheduled commencement date is not agreed as yet.

The proposed development provides for the expansion of the existing Inagh Wastewater Treatment plant. The expansion will occur to the west of the existing WWTP. It is proposed to expand the wastewater treatment facilities in two phases from a current 550PE (Population Equivalent) to 1200PE. The second phase will increase the PE further from 1200PE to 1850PE. The sewer network will be designed to carry a hydraulic load of 6DWF. The project will also involve the construction of a new pumping station to replace the existing one at Church Yard and to provide a back up generator along with increased capacity of 50m^3. The overflow facility from the existing pumping station will be decommissioned. Phosphorous removal will be necessary in the design criteria to reduce P levels. The Total P and N levels in the effluent stream may need to be reduced further in the future and allowance will be made for this reduction at design stage. The outfall from the WWTP will be to the adjacent Inagh River and access to the site will be via the existing lane, which connects the public road to the site.

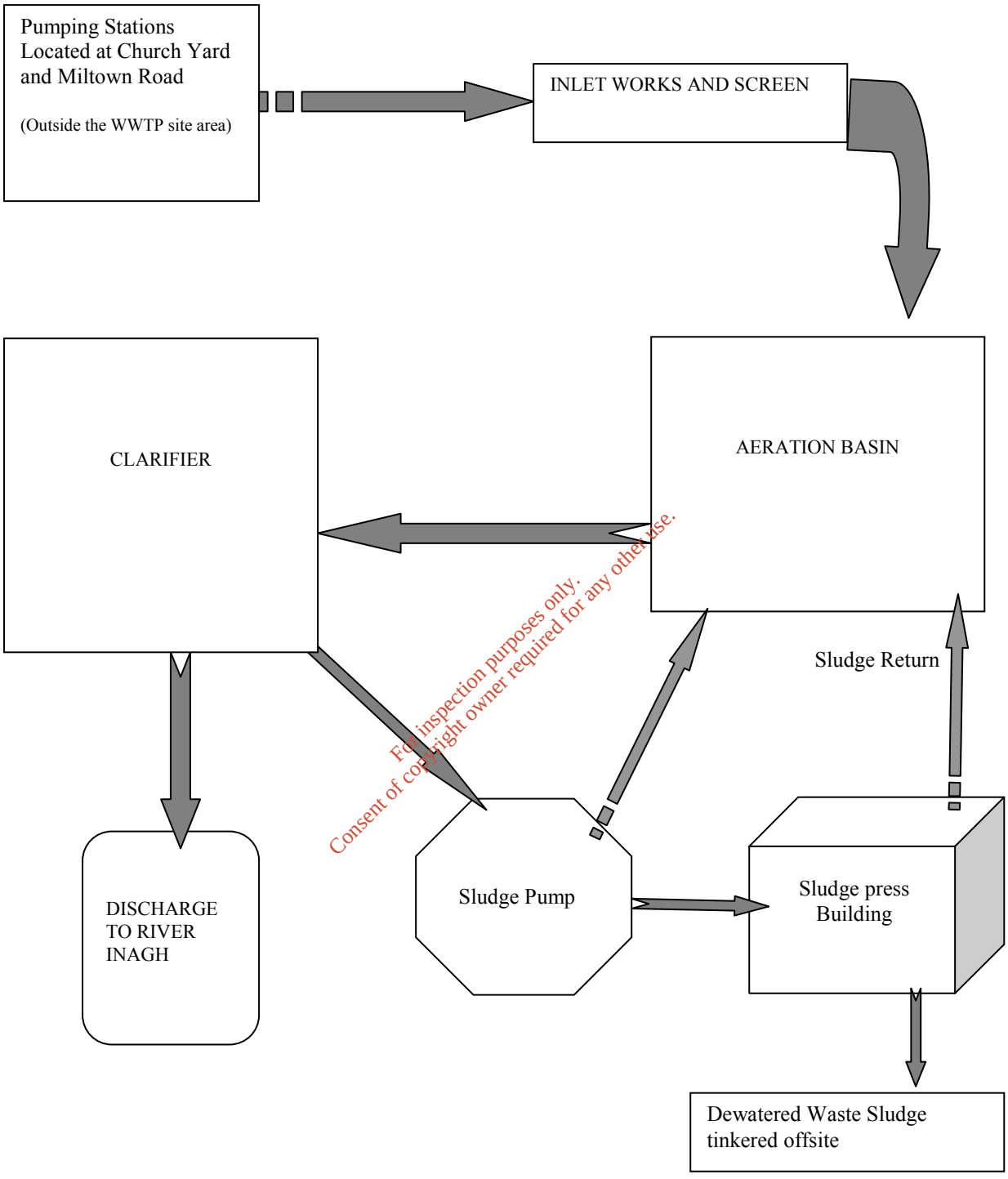
10. Measures planned to monitor emissions into the environment

Provisions for monitoring emissions from the wastewater treatment plant are in place at the Inagh WWTP. A full time laboratory technician is employed to cater for the operational requirements in terms of monitoring at the Inagh treatment plant. Monitoring of influent and effluent wastewater streams is undertaken between eight and ten times per annum 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 grab sample for both the influent and effluent streams.

Attachment A.2

Flow diagram for wastewater treatment plant

Flow Diagram for Inagh Waste Water Treatment Plant



Attachment A.3

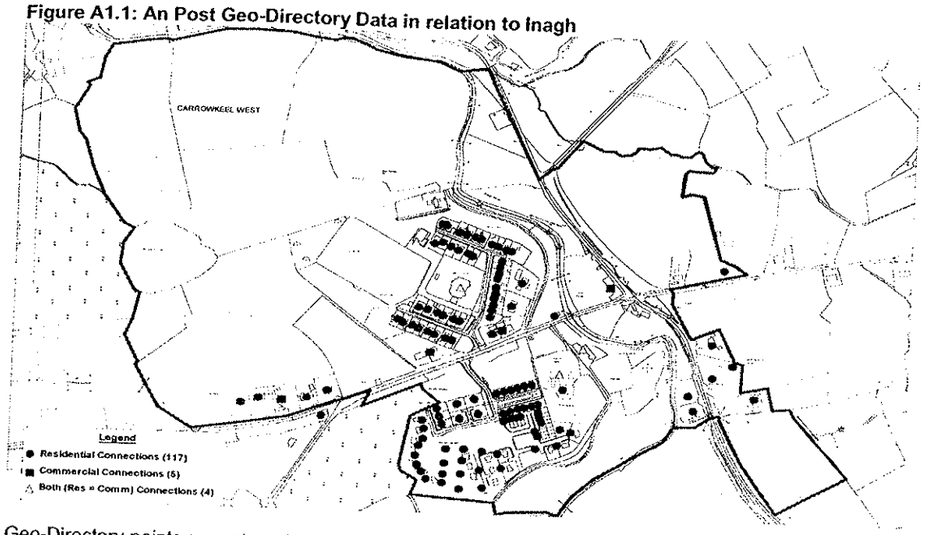
Population Data

Appendix A Population Data

A1.1 Domestic Demand

Figure A1.1 shows the An Post Geo-Directory points as provided by Clare County Council in September 2007

Figure A1.1: An Post Geo-Directory Data in relation to Inagh



Geo-Directory points are categorised by use as follows:

Residential = Domestic only connections
Both = A connection which includes both domestic and non domestic use, for example; a hairdressers with an upstairs apartment.
Commercial = Commercial only connections

In order to calculate the total number of domestic connections it is necessary to sum the "Residential" and "Both" categories as detailed in Table A1.1 below.

DMA	"Residential" Points	"Both" Points	Total
Inagh	113	4	117

Table A1.1

There are a total of 117 domestic connections within the Inagh area.

The population to be served by the Inagh sewerage scheme is estimated by the product of the no. of domestic connections (calculated as 117) by the occupancy rate. It is therefore necessary to calculate the occupancy rate.

In order to calculate the occupancy rate, Census 2006 data for the Ballylea District Electoral Divisions (DED) was examined. From An Post Geo-Directory data, the number of domestic (= "residential" + "both" categories) was extracted for the Inagh and surrounds.

Because the An Post Geo-Directory data is from 2007, it was necessary to apply a population growth percentage to the 2006 Census population, to arrive at an estimated 2007 DED population.

Table A1.2

DED Name	2006 Census Popn	2007 Population Estimate (= 2006 Pop.+ 1.15%)	Residential Geodirectory Points in DED (2007)	Occupancy rate in DED
	(A)	(B)	(C)	(D = B/C)
Inagh	170	196	117	1.67

The estimated average occupancy rate for Inagh is 1.67 persons per house. This is considerably less than the Census 2006 recorded average occupancy rate for County Clare of 2.79 persons per household.

For the purposes of this report, the average occupancy rate for each domestic connection will be assumed to be the county average occupancy rate of 2.79 as contained Census.

A1.2 Non-Domestic Demand

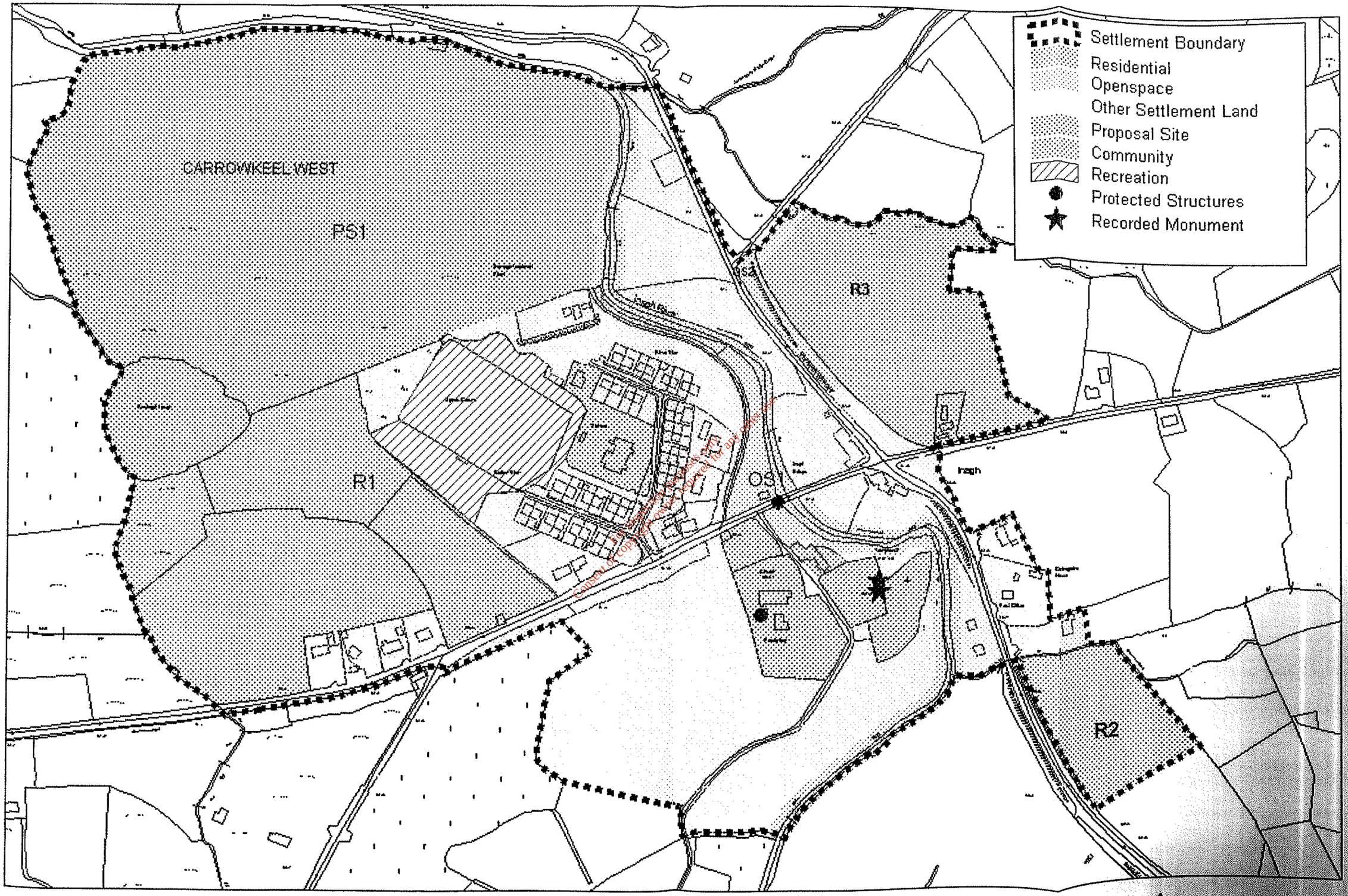
Commercial/Others Category for Inagh

User	Number	Hydraulic Loading l/h/d	No. of heads	Total Litres/d
Primary School	1	45	130 115 +15 staff	14,950
Pubs	2	10	15	300
Shops	2	45	10	450
Petrol Station	1	45	4	180
Brewery	1			1000
Gaa Pitch	1	20	30	600
Church	1	45	2	90
Community Centre	1	20	30	600
Garage	1	45	2	90
Total				18,260

A1.3 Summary of Demand Forecast

	Residential	Commercial	Total
2007	**326**	81	407
2008	411	102	513
2009	497	129	625
2010	582	162	744
2011	668	204	872
2012	753	257	1010
2013	776	265	1041
2014	799	273	1072
2015	823	281	1104
2016	848	290	1137
2017	**873**	298	**1171**
2018	899	307	1206
2019	926	316	1242
2020	954	326	1280
2021	982	336	1318
2022	1012	346	1358
2023	1042	356	1398
2024	1074	367	1440
2025	1106	378	1484
2026	1139	389	1528
2027	1173	401	1574
2028	1208	413	1621
2029	1245	425	1670
2030	1282	438	1720
2031	1320	451	1771
2032	**1360**	465	**1825**

Planning Ref No.	*Applicant Name*	*Proposed Development*
062934	Ricric Ltd	To demolish a derelict house and agricultural buildings and to construct a residential and ancillary retail development. The proposed development will include; (a) 100 No. two story and two and a half storey houses; (b) 4 No. local retail units and associated signage; (c) 4 No. duplex residential units over proposed retails units; (d) crèche, (e) temporary on-site well; (f) site entrance; (g) temporary advertising signage during construction period; and (h) associated site development works. The proposed development also Includes for off-site works on land in the ownership/control of Clare County Council to include (i) the provision of a pedestrian ramp and pedestrian crossing from the application site across the N85; (ii) regarding and levelling of the road side (south western) boundary of the site to create a streetscape and (iv) provision of a new public sewer.
051321	Bernard Madigan & Mary Keane	To construct a housing development of 31 No. houses. It is to consist of 6 No. detached, 16 No. semi-detached and 9 No. terraced houses along with all associated site works, including a sewage pumping station and holding tank and connections to the main Inagh sewerage system and local group water scheme.
0265	Pat Hehir	To construct 56 No. dwelling houses, consisting of 24 No. terraced houses, 32 No. detached houses and service roads, footpaths etc. with connections to ancillary services.
04415	Pat Hehir	For permission. The site refers form part of an existing development Planning Ref. P02/65 currently under construction. The development is proposed in 2 Phases with connections to ancillary facilities and will consist of Phase 1. The construction of 6 No. Shop Units and 8 No. Apartments, access and car park. Phase 2. The construction of a 14 Bedroom Bed and Breakfast incorporation Restaurant and Craft Shop.
051046	Martin Queally	To construct 14 No. detached two storey houses (consisting of 4 No. three bedroom houses and 10 No. four bedroom houses), upgrading of existing access road and associated development works



Inagh
Scale 1:5000

Attachment A.5

River Inagh Monitoring Data

WFD Rivers Monitoring Programme Results April 2007 - March 2009

Name	0210 - 750m d/s Inagh Br - on N85																
Sample Date	Alk	NH_3 (N)	BOD (O2)	Chloride (Cl)	COD (O2)	Col	Cond @ 25°C	DO % Sat	DO mg/l	Hardnes ($CaCO_3$)	NO_3 (N)	NO2 (N)	Ortho-P (P)	pH	SS	Temp	Total Ni (N)	Total Oxidised Nitrogen (N)
23/04/2007	70	0.262	3	26		63	234	98.3		70	0.244	0.026	0.036	7.9		14	0.27	
28/05/2007	36	0.046	2	28		76	186	103.5		66	0.114	0.005	0.008	7.8		13.4	0.119	
27/06/2007	38	0.046	2.1	27		148	186	102		58	0.203	0.008	0.013	7.62		15.9	0.211	
25/07/2007	50	0.013	1.5	26		158	192	106.5	10	108	0.27	0.007	0.008	7.65		17.7	0.277	
22/08/2007	46	0.035	1.4	24	45	191	175	102.2	9.88	54	0.138	0	0.019	7.5	3.4	17.5	0.138	
27/09/2007	40	0.024	2.6	25		140	181	96.7	10.55	68	0.13	0	0.014	7.56		11.4	0.13	
04/12/2007	40	0.02	1.63	33		112	209	91.1	9.96	66	0.489	0.001	0.019	7.48		10.3	0.49	
28/01/2008	43	0.024	1.57	29		91	184	96.9	11.59	48.4	0.492	0.002	0.015	7.73		8.1	0.494	
26/02/2008	32	0.025	0.64	25		109	150	97.7	11.4	33.8	0.203	0	0.021	7.35		7.4	0.203	
25/03/2008	50	0.027	2.85	35		77	213	110.6	12.16	15	0.189	0.002	0.012	7.89		9.9	0.191	
21/04/2008	56	0.0836	2.12	32		79	215	109.6	12.45	59.47	0.1507	0.0018	0.010	7.93		9.9	0.1525	
28/05/2008	53	0.036	2.06	30		98	199	113	11.34	55.2	0.127	0.001	0.014	8.03		14.9	0.128	
23/06/2008	39	0.026	2.9	33		144	204	97.6	9.99	64	0.21	0.001	0.018	7.48		14.7	0.21	
22/07/2008	117	0.02	1.2	32		157	372	99.8	10.3	148.2	0.695	0	0.029	8.21		15.1	0.695	
20/08/2008	45	0.052	1.5	24		264	156	94.3	9.41	43	0.096	0	0.025	6.92		15.5	0.096	
23/09/2008	57	0.014	1.8	24		207	186	100.6	11.19	68.8	0.252	0	0.025	7.41		13.1	0.252	
08/10/2008	86	0.44	<2	19		175	139		9.2	40	BLD	<0.0003	0.045	7.2		11.6		<0.002
12/11/2008	34	0.054	<2	20		100	130		10.7	106	0.3263	0.014	0.011	7.54		7.6		0.33
10/12/2008	20	<0.002	<2	22	NT	85	168		11.7	56	<0.05	<0.00025	<0.001	7.42	NT	6.4		0.03
14/01/2009	36	0.115	<2	17	NT	125	125		11.43	12	<0.001	0.008	<0.001	7.31	NT	5.8	NT	<0.001
11/02/2009	60	0.031	<2	21	NT	85	171		12.83	96	0.48	<0.00025	0.012	7.73	4	4.1		0.47
03/03/2009	68	0.013	2	22		150	177	96	10.88	92	0.188	<0.00025	0.013	7.59		8.3		0.188
31/03/2009	74	0.043	<2	27	NT	70	218	103.6	11.62	112	<0.001	0.0019	0.019	7.77	NT	9.9		<0.001
Median	**46**	**0.033**	**2.0**	**26**	**45**	**112**	**186**	**100.2**	**11.0**	**64**	**0.203**	**0.002**	**0.015**	**7.59**	**3.7**	**11.4**	**0.207**	**0.259**
95% Percer	**85**	**0.255**	**2.9**	**33**	**45**	**205**	**232**	**111.0**	**12.5**	**112**	**0.512**	**0.015**	**0.036**	**8.02**	**3.97**	**17.3**	**0.544**	**0.449**

Name	0300 - Moananagh Br																
Sample Date	Alk	NH_3 (N)	BOD (O2)	Chloride (Cl)	COD (O2)	Col	Cond @ 25°C	DO % Sat	DO mg/l	Hardnes ($CaCO_3$)	NO_3 (N)	NO_2 (N)	Ortho-P (P)	pH	SS	Temp	Total Ni (N)	Total Oxidised Nitrogen (N)
23/04/2007	58	0.023	2	28		56	210	95.2		60	0.062	0.003	0.006	7.77		14.4	0.065	
28/05/2007	32	0.015	1.6	31		81	180	99.3		64	0.09	0.003	0.003	7.87		14.5	0.093	
27/06/2007	32	0.041	2	30		150	162	90.5		48	0.17	0.009	0.009	7.21		15.8	0.179	
25/07/2007	40	0.02	1.9	28		186	166	96.4	8.93	89	0.136	0.008	0.004	7.27		18.4	0.144	
22/08/2007	36	0.063	1.7	24		237	148	80.7	7.97	60	0.083	0	0.023	7.02		16.6	0.083	
27/09/2007	36	0.03	2.2	26		181	160	81.7	8.9	54	0.097	0	0.017	7.09		11.6	0.097	
04/12/2007	28	0.025	1.8	31		117	173	88.8	9.85	50	0.525	0.001	0.012	7.7		9.4	0.526	
28/01/2008	28	0.049	1.82	31		105	171	94.5	11.02	31.26	0.482	0.002	0.03	7.68		8.1	0.484	
25/03/2008	41	0.032	1.9	37		73	205	106	11.82	24.8	0.185	0	0.012	7.94		9.7	0.185	
21/04/2008	44	0.0189	1.44	36		71	206	105.3	12.06	54.3	0.1043	0.0053	0.0055	7.92		9	0.1096	
28/05/2008	39	0.046	1.88	31		112	180	99.4	9.83	48	0.088	0	0.006	7.81		15.5	0.088	
23/06/2008	42	0.048	3	35		142	210	85.8	8.79	64	0.239	0.001	0.014	7.43		14.6	0.24	
22/07/2008	107	0.022	1.8	32		110	357	110.6	10.73	142.4	0.457	0	0.026	8.57		17.4	0.457	
20/08/2008	35	0.048	2.4	24		257	136	73.69	7.21	33.3	0.122	0	0.023	6.49		15.8	0.122	
23/09/2008	49	0.036	1.38	25		224	173	89.9	9.45	60.1	0.234	0	0.032	7.28		13.7	0.234	
08/10/2008	84	0.35	<2	20		200	130		8.4	16	BLD	<0.0003	0.022	6.95		12.9		<0.002
12/11/2008	48	0.05	<2	20		100	129		10.4	94	0.2062	0.004	0.01	7.38		7.5		0.21
10/12/2008	104	<0.002	<2	24	NT	85	141		10.9	78	<0.05	<0.00025	<0.001	7.45	NT	6.9		0.08
14/01/2009	30	0.12	<2	20	NT	100	125		10.87	12	0.03	0.007	<0.001	7.06	NT	5.7	NT	0.04
11/02/2009	40	0.085	<2	26	NT	85	171		12.23	90	0.53	<0.00025	0.011	7.55	<2	3.1		0.52
03/03/2009	42	0.04	2	26	NT	175	172	98	11.28	114	0.261	<0.00025	0.01	7.52	NT	7.6		0.262
31/03/2009	42	0.052	<2	29	NT	85	168	95.6	10.56	78	<0.001	0.0011	0.022	7.63	NT	10.8		<0.001
Median	**40**	**0.041**	**1.9**	**28**	**NT**	**111**	**171**	**95.2**	**10.4**	**60**	**0.170**	**0.001**	**0.012**	**7.49**	**<2**	**12.3**	**0.144**	**0.210**
95% Percer	**103**	**0.120**	**2.55**	**36**	**NT**	**236**	**210**	**107**	**12.08**	**113.00**	**0.526**	**0.008**	**0.030**	**7.94**	**<2**	**17.4**	**0.497**	**0.468**

Samples taken between April 2007 and September 2008 were sampled and analysed by: Roscommon Lab
Samples taken between October 2008 and March 20098 were sampled and analysed by: Clare County Council

Attachment A.6

Summary Monitoring Data

Summary monitoring data for Br on N85 (28I01 0210) 750m downstream of Inagh WWTP

Parameter	No. of Samples	Mean	Median	Min	Max	95%ile	High Status Mean	Good Status Mean	High Status 95%ile	Good Status 95%ile
BOD	23	1.93	2.00	0.64	3.0	2.92	≤1.3	≤ 1.5	≤ 2.2	≤ 2.6
MRP-P	23	0.018	0.015	0.008	0.045	0.036	≤ 0.025	≤ 0.035	≤ 0.045	≤ 0.075
NH_3-N	23	0.066	0.033	0.013	0.440	0.255	≤ 0.040	≤ 0.065	≤ 0.090	≤ 0.140

Draft European Communities Environmental Objectives (Surface Waters) Rgulations, 2008

Summary monitoring data for Monnanagh Br. (27I01 0300) downstream of Inagh WWTP

Parameter	No. of Samples	Mean	Median	Min	Max	95%ile	High Status Mean	Good Status Mean	High Status 95%ile	Good Status 95%ile
BOD	23	1.93	1.89	1.38	3.0	2.55	≤1.3	≤ 1.5	≤ 2.2	≤ 2.6
MRP-P	23	0.033	0.012	0.003	0.032	0.03	≤ 0.025	≤ 0.035	≤ 0.045	≤ 0.075
NH_3-N	23	0.058	0.041	0.015	0.350	0.120	≤ 0.040	≤ 0.065	≤ 0.090	≤ 0.140

Draft European Communities Environmental Objectives (Surface Waters) Regulations, 2008

B1 Map showing Agglomeration Catchment served by Inagh Waste Water Treatment Plant, Location of WWTP, Pumping Station and Sampling Points

Attachment B.2

Site Layout Map No 5

Sewage Treatment Plant

NORTH

SLUDGE SUMP

TO SLUDGE BELT PRESS

EXISTING SLUDGE BELT PRESS HOUSING

EXISTING SLUDGE SUMP

EXISTING CLARIFICATION AND AERATION UNIT

EXISTING WWTP

EXISTING SITE OFFICE

EXISTING INLET WORKS

Inagh

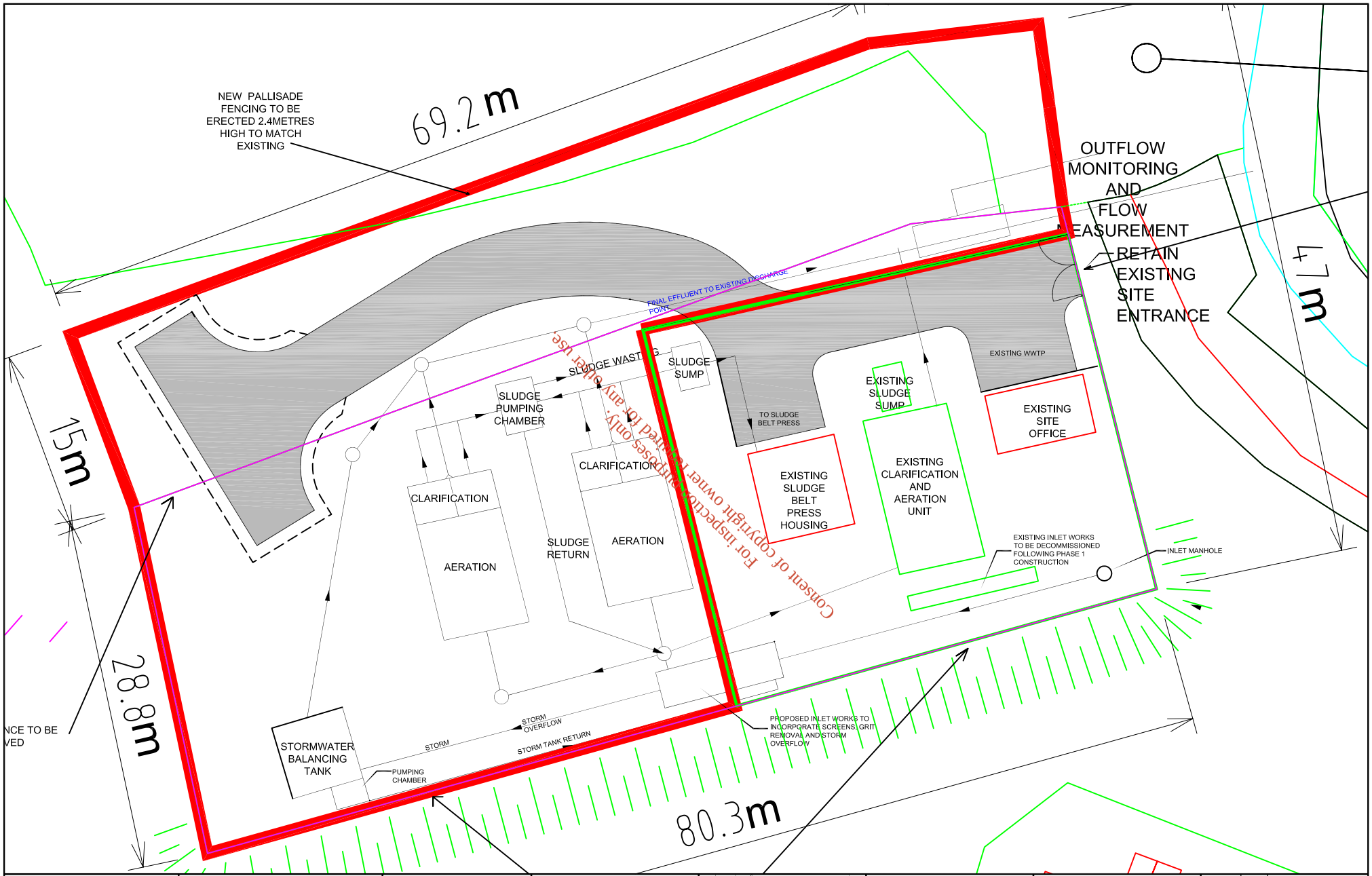
CLARE COUNTY COUNCIL

New Road, Ennis, Co. Clare. Ph:- +353 65 6821616 Fax:- +353 65 68 21915
E-mail:- design@clarecoco.ie Web:- www.clare.ie
David L Timlin BE., BA, C.Eng., F.I.E.Director of Services

Project Title:	INAGH WASTEWATER TREATMENT	Drawing Title:	SITE PLAN
		Scale:	1:500
Project Address:	INAGH, CO. CLARE	Drawing Ref:	05
		Revision No:	Revision Number A
Design By:	--	Drawn By:	JMG
Project Ref:		Checked By:	--
Server Location.:-		Date:	29TH OCTOBER 2008

Attachment B.3

Site Layout Map No 13



LEGEND:

- EXISTING WWTP
- PROPOSED EXTENSION TO WWTP

RPS Consulting Engineers

RPS Consulting Engineers, Lyrr Building, IDA Business & Technology Park, Mervue, Galway, Ireland.

T: +353 91 534100 - F: +353 91 534199
E: ireland@rpsgroup.ie W: www.rpsgroup.com/ireland

NOTES

1. This drawing is the property of RPS Consulting Engineers. It is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. All Levels refer to Ordnance Survey Datum, Main Head.
3. DO NOT SCALE, use figured dimensions only, if in doubt ask.

No.	Date		Amendment / Issue	App.
A01	03.10.08	R/S	ISSUE FOR APPROVAL	PG
D01	31.01.08	R/S	Draft Issue	G.C.

Project: INAGH SERVICED LAND INITIATIVE SEWERAGE SCHEME PART VIII - PLANNING

Title: PROPOSED INAGH WWTP SITE LAYOUT

Drawn by:	M.G.	Job No:	MGW0097
Checked by:	C.B.	File No:	MGW0097DG0011
Approved by:	G.C.	Drg. No:	DG0011-01
Scale:	N.T.S	Rev:	A01
Date:	Jan. '08		

Attachment B6

Part VIII Planning Application

Attachment B6
The attached are conditions of Part VIII that was granted in 2009 for the expansion of the wastewater treatment plant. Ref **P08/8024**

Clare County Council – Planning Section
Part VIII Planning and Development Regulations 2001.

REPORT TO MEMBERS

File Reference: P08/8024
Development : Inagh Wastewater Treatment Plant Expansion
Location: Carrowkeel East, Co. Clare.

Nature and extent of the proposed development and the principle features thereof.

The proposed development comprises of the expansion of the existing Inagh Wastewater Treatment plant. The site is located in the village of Inagh directly adjacent to the Inagh River and to the north east of the GAA field. There is an existing municipal plant on this site and it is proposed to expand the same in two phases from a current 550PE (Population Equivalent) to 1200PE. The second phase increases this further from 1200PE to 1850PE. The expansion will occur to the west of the current plant. It is proposed that the outfall from the plant be to the adjacent Inagh River.

Evaluation of the likely implications, if any of the proposed development with respect to the proper planning and development of the area in which the development would be situated.

The proposed development is an extension to the municipal wastewater treatment plant on lands zoned as 'Other Settlement Land' in the North Clare Local Area Plan 2005. It is considered that the principal of such a development at this location is acceptable.

List of persons or bodies who made submissions or observations.

There is 1 submission on file as follows:
Environment Section of Clare County Council (23/11/08) – recommends that final effluent from the plant to the adjacent Inagh River to meet the following emission limit values;

BOD	10mg/L
SS	10mg/L
Total P	2mg/L
Total N	15mg/L

The report further notes that the Total P and N may need to be reduced further in the future and that allowance be made for the same without undue further expense. It is stated that P levels, phosphorous removal will be necessary.

Summary of the issues with respect to the proper planning and orderly development of the area raised by persons making submissions.

The report from the Environment Section is noted and it is considered that these issues can be addressed by way of condition

Response of the Local Authority thereto.

Policy

North Clare Local Area Plan

It is noted that the proposed development site is specifically zoned as 'Other Settlement Land' in the North Clare Local Area Plan and is located directly adjacent to lands zoned as PS1, proposal site. It is stated under the objective for the PS1 proposal site that the treatment works, which are located adjacent to this site '*would require to be upgraded'*

While it is noted that the existing treatment plant and proposed extension to same is located on lands zoned as 'Other Settlement Land' in the North Clare Local Area Plan 2005, having regard to its location directly adjacent to the PS1 proposal site and the objective stated therein in relation to the upgrade to the wastewater treatment plant, it is considered that the proposed development complies with this objective.

Other Issues

Access to the site is via an existing lane which connects the public road to the site. It is noted that this lane has recently being upgraded to facilitate development of a housing scheme located to the north of the proposed development site under P05-1046. It is considered that the access is sufficiently wide to serve the treatment plant. It is considered that the proposed development would not have any traffic hazard implications.

It is noted the dwellings are located within 36 metres of the wastewater infrastructure of proposed development site. It is noted that there is only 26 metres between the present plant and the adjacent houses.. However, having regard to the fact that the proposed development represents an upgrade and extension of an existing plant the proposed development is considered acceptable. It is noted that there is at least 50 metres from the proposed extension to the housing development to the north permitted under P05-1046

Recommendation to the Elected Members

I recommend to the Elected Members that the development should proceed, in accordance with the following.

The manner in which the development is proposed to proceed:

Having regard to the location of the site within the settlement boundary of Inagh, the policies of the North Clare Local Area Plan 2005, amended 2008, and, considering the nature of development proposed it is considered that, subject to conditions, the proposed development would not seriously injure the amenities of the area or of property in the vicinity.

1. The proposed development shall be carried out in accordance with plans and particulars received on 07/11/08 except where altered or amended by the following;

2. Final outfall from the treatment plant to the Inagh River shall meet the following emission limit values;

Biological Oxygen Demand	10mg/L
Suspended Solids	10mg/L
Total Phosphorus	2mg/L
Total Nitrates	15mg/L

In addition to the same Total Phosphorus and Nitrate levels may need to be reduced further in the future and that allowance shall be made for the same in the design. In this regard Phosphorous removal measures will be necessary. Prior to the commencement of development full design details of the wastewater treatment plant to allow for the above shall be agreed in writing with the Planning Authority.

3. The development shall be landscaped as follows

i. Native hedging such as beech shall be planted along the fence line of the treatment plant. Plants shall be at least 1.0metres in height at planting time and shall be planted at 1.0 metre intervals along the fenceline

This landscaping shall be implemented not later than the first planting season after commencement of the development. Any planting that is diseased or fails within 2 years of planting shall be replaced. Full details in regard to the same shall be agreed with the Planning Authority prior to the commencement of development.

Monica Meehan,
Senior Executive Officer,
Economic, Development & Planning

Attachment B 6.1

Part VIII Planning Approval

COMHAIRLE CONTAE AN CHLÁIR
CLARE COUNTY COUNCIL

P08-8024

At the March monthly meeting of Clare County Council held on Monday,

9th March, 2009 it was:

Proposed by: Cllr. F. Garvey

Seconded by: Cllr J. Arkins

And agreed

"That pursuant to Part VIII of the Planning and Development Regulation 2007, Clare County Council proceed with the Inagh Wastewater Treatment Plant Expansion at Carrowkeel West, Inagh, Co. Clare. "

Signed: Richard McNamara
Riarthóir Cruinnithe.

Signed: Madeleine Taylor
Méara.

Dated: 9 - 3 - 2009

Seirbhísí Corparáideacha
Áras Contae an Chláir, Bothar Nua, Inis, Co. an Chláir

Corporate Services
Áras Contae an Chláir, New Road, Ennis, Co. Clare

T: 065 6846209 F: 065 6820882 E: info@clarecoco.ie W: www.clarecoco.ie

Attachment B.8

Newspaper Notice

Newspaper Notice

APPLICATION TO THE ENVIRONMENTAL PROTECTION AGENCY FOR A WASTE WATER DISCHARGE LICENCE UNDER THE WASTE WATER DISCHARGE (AUTHORISATION) REGULATIONS 2007.

The applicant, Clare County Council, New Road, Ennis, County Clare, intends applying to the Environmental Protection Agency for a wastewater discharge licence under the above named regulation.

The wastewater treatment plant associated with the application, Inagh Waste Water Treatment Plant, is located in the Townland of Carrowkeel West, Inagh, County Clare. The National Grid reference for the wastewater treatment plant is E120626; N181501.

The Inagh Waste Water Treatment process comprises preliminary screening, activated sludge treatment, clarifier, sludge thickening and sludge dewatering with the sludge disposal off site. The final effluent from the wastewater treatment plant discharges via an outfall pipe from the wastewater treatment facility to the River Inagh, adjacent to the treatment plant. The National Grid Reference for the Primary Discharge Point at the end of the outfall pipe is E120649; N181503.

Secondary emergency discharges may also take place from the stormwater overflow pipe located on the collection system at the Church Yard pumping station in the Townland of Carrowkeel West, Inagh, County Clare. The National Grid reference for the secondary discharge is E120834; N181287.

A copy of the application for the waste water discharge licence and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the application, in such a format as may be determined by the Environmental Protection Agency, shall, as soon as is practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Agency and at the principal office of Clare County Council, the relevant water services authority for this application.

Submissions in relation to the application may be made to the Agency at its headquarters at the EPA, Office of Climate, Licensing and Resource Use, PO Box 3000, Johnstown Castle Estate, Wexford, Tel: 053 916 0600 and Fax: 053 916 0699.

Signed:

Clare County Council,
Environment and Water Services,
Áras Chontae an Chláir,
New Road,
Ennis,
Co. Clare.

"Insertion in Clare Champion": 12th June 2009

CLARE County Council

Comhairle Contae an Chlair

APPLICATIONS TO THE ENVIRONMENTAL PROTECTION AGENCY FOR WASTE WATER DISCHARGE LICENCES UNDER THE WASTE WATER DISCHARGE (AUTHORISATION) REGULATIONS 2007.

The applicant, Clare County Council, New Road, Ennis, County Clare, intends applying to the Environmental Protection Agency for a wastewater discharge licence under the above named regulation.

The wastewater treatment plant associated with the application, Inagh Waste Water Treatment Plant, is located in the Townland of Carrowkeel West, Inagh, County Clare. The National Grid reference for the wastewater treatment plant is E120626; N181501.

The Inagh Waste Water Treatment process comprises preliminary screening, activated sludge treatment, clarifier, sludge thickening and sludge dewatering with the sludge disposal off-site. The final effluent from the wastewater treatment plant discharges via an outfall pipe from the wastewater treatment facility to the River Inagh, adjacent to the treatment plant. The National Grid Reference for the Primary Discharge Point at the end of the outfall pipe is E120649; N181503.

Secondary emergency discharges may also take place from the stormwater overflow pipe located on the collection system at the Church Yard pumping station in the Townland of Carrowkeel West, Inagh, County Clare. The National Grid reference for the secondary discharge is E120834; N181287.

A copy of the application for the waste water discharge licence and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the application, in such a format as may be determined by the Environmental Protection Agency, shall, as soon as is practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Agency and at the principal office of Clare County Council, the relevant water services authority for this application.

Submissions in relation to the application may be made to the Agency at its headquarters at the EPA, Office of Climate, Licensing and Resource Use, PO Box 3000, Johnstown Castle Estate, Wexford, Tel: 053 916 0600 and Fax: 053 916 0699.

The applicant, Clare County Council, New Road, Ennis, County Clare, intends applying to the Environmental Protection Agency for a wastewater discharge licence under the above named regulation.

The wastewater treatment plant associated with the application, Kilkishen Wastewater Treatment Plant, is located at Kilkishen, in the Townland of Clonlea, Kilkishen County Clare. The National Grid reference for the wastewater treatment plant is E150352; N172988.

The Kilkishen Wastewater Treatment process comprises of preliminary screening, activated sludge treatment, clarifier, sludge thickening, sludge dewatering with sludge disposal off site and phosphate removal. The final effluent from the domestic wastewater treatment plants discharges via an outfall pipe from the waste water treatment facility to Clonlea Lough. The National Grid Reference for the Primary Discharge Point at the end of the outfall pipe is E150433; N172834.

Secondary emergency discharges may also take place from the following:

(a) The stormwater overflow pipe located on the collection system at Dun an Oir pumping station in the Townland of Clonlea, Kilkishen, County Clare. The National Grid Reference for this Secondary Discharge Point at the end of the outfall pipe is E150042; N1728240 and at
(b) The stormwater overflow pipe located on the collection system at Plunkett Drive pumping station in the Townland of Clonlea, Kilkishen, County Clare. The National Grid Reference for this Secondary Discharge Point at the end of the outfall pipe is E149221; N173147.

A copy of the application for the waste water discharge licence and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the application, in such a format as may be determined by the Environmental Protection Agency, shall, as soon as is practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Agency and at the principal office of Clare County Council, the relevant water services authority for this application.

Attachment B.8

Site Notice

Site Notice

APPLICATION TO THE ENVIRONMENTAL PROTECTION AGENCY FOR A WASTE WATER DISCHARGE LICENCE UNDER THE WASTE WATER DISCHARGE (AUTHORISATION) REGULATIONS 2007.

The applicant, Clare County Council, New Road, Ennis, County Clare, intends applying to the Environmental Protection Agency for a wastewater discharge licence under the above named regulation.

The wastewater treatment plant associated with the application, Inagh Waste Water Treatment Plant, is located in the Townland of Carrowkeel West, Inagh, County Clare. The National Grid reference for the wastewater treatment plant is E120626; N181501.

The Inagh Waste Water Treatment process comprises preliminary screening, activated sludge treatment, clarifier, sludge thickening and sludge dewatering with the sludge disposal off site. The final effluent from the wastewater treatment plant discharges via an outfall pipe from the wastewater treatment facility to the River Inagh, adjacent to the treatment plant. The National Grid Reference for the Primary Discharge Point at the end of the outfall pipe is E120649; N181503.

Secondary emergency discharges may also take place from the stormwater overflow pipe located on the collection system at the Church Yard pumping station in the Townland of Carrowkeel West, Inagh, County Clare. The National Grid reference for the secondary discharge is E120834; N181287.

A copy of the application for the waste water discharge licence and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the application, in such a format as may be determined by the Environmental Protection Agency, shall, as soon as is practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Agency and at the principal office of Clare County Council, the relevant water services authority for this application.

Submissions in relation to the application may be made to the Agency at its headquarters at the EPA, Office of Climate, Licensing and Resource Use, PO Box 3000, Johnstown Castle Estate, Wexford, Tel: 053 916 0600 and Fax: 053 916 0699.

Signed:

Clare County Council,
Environment and Water Services,
Áras Chontae an Chláir,
New Road,
Ennis,
Co. Clare.

"Insertion in Clare Champion": 12th June 2009

Attachment B.9(i)

Population Agglomeration:

Attachment B.9(i)

Average flow measurement during 2008: 140m^3

Mean BOD_5 for period 2007/2008: 117 mg/l

Population equivalent : 273 (using flow and mean BOD loading)

Population equivalent: 622 (based on 225 litres/head/day)

Attachment B.9(ii)

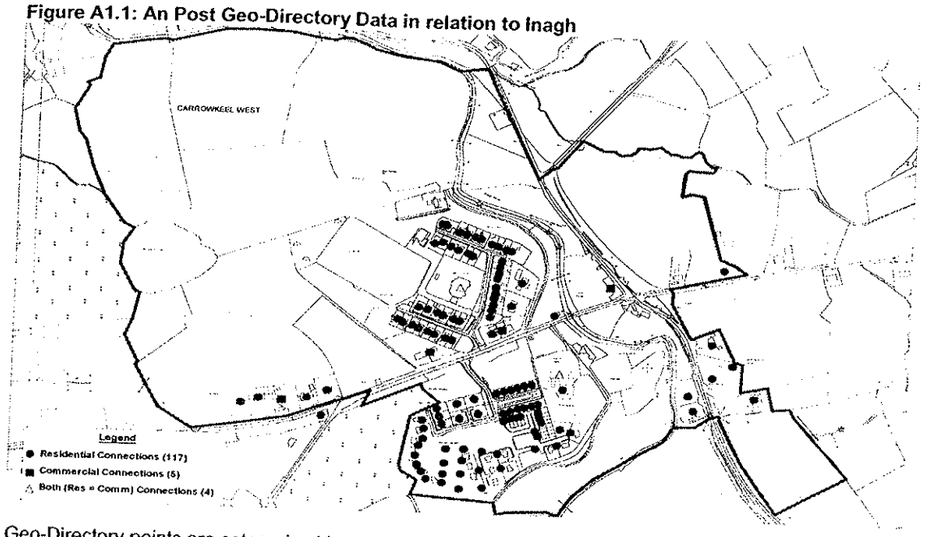
Population Data

Appendix A Population Data

A1.1 Domestic Demand

Figure A1.1 shows the An Post Geo-Directory points as provided by Clare County Council in September 2007

Figure A1.1: An Post Geo-Directory Data in relation to Inagh



Geo-Directory points are categorised by use as follows:

Residential = Domestic only connections
Both = A connection which includes both domestic and non domestic use, for example; a hairdressers with an upstairs apartment.
Commercial = Commercial only connections

In order to calculate the total number of domestic connections it is necessary to sum the "Residential" and "Both" categories as detailed in Table A1.1 below.

DMA	"Residential" Points	"Both" Points	Total
Inagh	113	4	117

Table A1.1

There are a total of 117 domestic connections within the Inagh area.

The population to be served by the Inagh sewerage scheme is estimated by the product of the no. of domestic connections (calculated as 117) by the occupancy rate. It is therefore necessary to calculate the occupancy rate.

In order to calculate the occupancy rate, Census 2006 data for the Ballylea District Electoral Divisions (DED) was examined. From An Post Geo-Directory data, the number of domestic (= "residential" + "both" categories) was extracted for the Inagh and surrounds.

Because the An Post Geo-Directory data is from 2007, it was necessary to apply a population growth percentage to the 2006 Census population, to arrive at an estimated 2007 DED population.

Table A1.2

DED Name	2006 Census Popn	2007 Population Estimate (= 2006 Pop.+ 1.15%)	Residential Geodirectory Points in DED (2007)	Occupancy rate in DED
	(A)	(B)	(C)	(D = B/C)
Inagh	170	196	117	1.67

The estimated average occupancy rate for Inagh is 1.67 persons per house. This is considerably less than the Census 2006 recorded average occupancy rate for County Clare of 2.79 persons per household.

For the purposes of this report, the average occupancy rate for each domestic connection will be assumed to be the county average occupancy rate of 2.79 as contained Census.

A1.2 Non-Domestic Demand

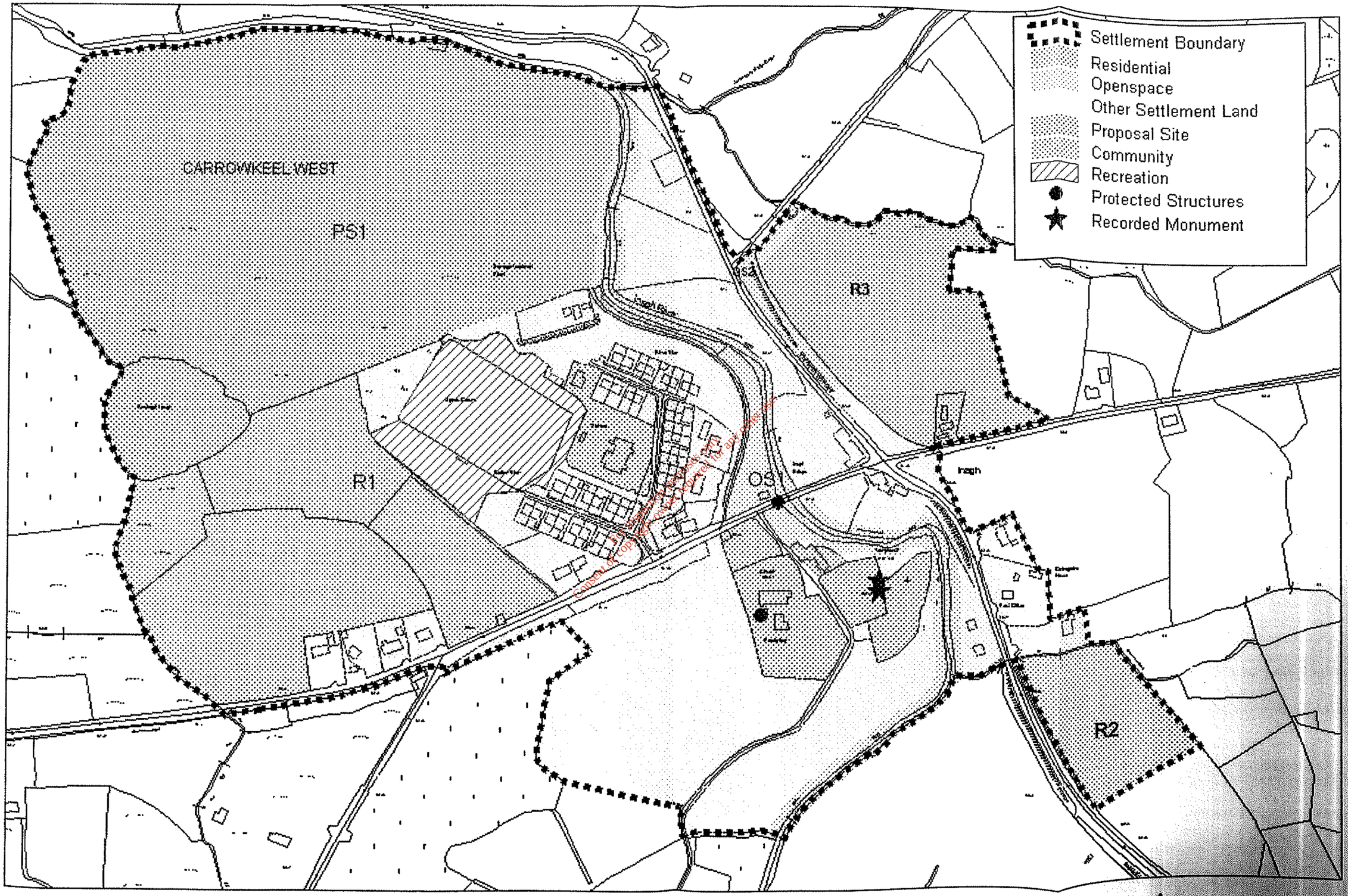
Commercial/Others Category for Inagh

User	Number	Hydraulic Loading l/h/d	No. of heads	Total Litres/d
Primary School	1	45	130 115 +15 staff	14,950
Pubs	2	10	15	300
Shops	2	45	10	450
Petrol Station	1	45	4	180
Brewery	1			1000
Gaa Pitch	1	20	30	600
Church	1	45	2	90
Community Centre	1	20	30	600
Garage	1	45	2	90
Total				18,260

A1.3 Summary of Demand Forecast

	Residential	Commercial	Total
2007	**326**	81	407
2008	411	102	513
2009	497	129	625
2010	582	162	744
2011	668	204	872
2012	753	257	1010
2013	776	265	1041
2014	799	273	1072
2015	823	281	1104
2016	848	290	1137
2017	**873**	298	**1171**
2018	899	307	1206
2019	926	316	1242
2020	954	326	1280
2021	982	336	1318
2022	1012	346	1358
2023	1042	356	1398
2024	1074	367	1440
2025	1106	378	1484
2026	1139	389	1528
2027	1173	401	1574
2028	1208	413	1621
2029	1245	425	1670
2030	1282	438	1720
2031	1320	451	1771
2032	**1360**	465	**1825**

Planning Ref No.	*Applicant Name*	*Proposed Development*
062934	Ricric Ltd	To demolish a derelict house and agricultural buildings and to construct a residential and ancillary retail development. The proposed development will include; (a) 100 No. two story and two and a half storey houses; (b) 4 No. local retail units and associated signage; (c) 4 No. duplex residential units over proposed retails units; (d) crèche, (e) temporary on-site well; (f) site entrance; (g) temporary advertising signage during construction period; and (h) associated site development works. The proposed development also Includes for off-site works on land in the ownership/control of Clare County Council to include (i) the provision of a pedestrian ramp and pedestrian crossing from the application site across the N85; (ii) regarding and levelling of the road side (south western) boundary of the site to create a streetscape and (iv) provision of a new public sewer.
051321	Bernard Madigan & Mary Keane	To construct a housing development of 31 No. houses. It is to consist of 6 No. detached, 16 No. semi-detached and 9 No. terraced houses along with all associated site works, including a sewage pumping station and holding tank and connections to the main Inagh sewerage system and local group water scheme.
0265	Pat Hehir	To construct 56 No. dwelling houses, consisting of 24 No. terraced houses, 32 No. detached houses and service roads, footpaths etc. with connections to ancillary services.
04415	Pat Hehir	For permission. The site refers form part of an existing development Planning Ref. P02/65 currently under construction. The development is proposed in 2 Phases with connections to ancillary facilities and will consist of Phase 1. The construction of 6 No. Shop Units and 8 No. Apartments, access and car park. Phase 2. The construction of a 14 Bedroom Bed and Breakfast incorporation Restaurant and Craft Shop.
051046	Martin Queally	To construct 14 No. detached two storey houses (consisting of 4 No. three bedroom houses and 10 No. four bedroom houses), upgrading of existing access road and associated development works



Inagh
Scale 1:5000

Attachment B.10.

Capital Investment Programme

Attachment B.10.

Capital Investment Programme

Under Clare County Council's Water Services Investment Programme 2007-2009 Clare County Council have the expansion of the wastewater treatment plant under a Serviced Land Initiative. The Preliminary Report was carried out in March 2008 and is with the Department Of Environment Heritage & Local Government for comment. A Part VIII planning application was lodged with the Planning Department in 2008. Approval was agreed to proceed with the development in March 2009.

Clare
Water Services Investment Programme 2007 –2009

Schemes at Construction	**W/S**	**Est. Cost.**
Ennis Town Water Supply Scheme Augmentation (H)	W	6,335,000
		6,335,000
Schemes to start 2007		
Ennis Town Water Supply Scheme (Treatment) (H)	W	6,819,000
Lisdoonvarna Water Supply Scheme Stage 2 (Ext. to Ballyvaughan)	W	5,768,000
Newmarket on Fergus Water Supply Scheme (excl. Advance Works)	W	5,624,000
		18,211,000
Schemes to start 2008		
Ballyvaughan*, Corofin* & Doolin Sewerage Scheme	S	18,025,000
Carrigaholt/Labasheeda Sewerage Scheme	S	12,000,000
Clare Sludge Management Plan (H)	S	5,624,000
Cooraclare Sewerage Scheme	S	1,570,000
Ennistymon, Liscannor, Miltown Malbay & Spanish Point Sewerage Scheme	S	12,875,000
Kilkee & Kilrush Sewerage Schemes	S	12,556,000
O'Callaghan's Mills, Bodyke, O'Brien's Bridge, Flagmount and Cratloe Sewerage Scheme	S	7,581,000
Quilty, Scarriff & Feakle* Sewerage Scheme	S	12,240,000
Shannon Town Sewerage Scheme (G)	S	9,775,000
West Clare Regional Water Supply Scheme (Contract 6)	W	9,200,000
		101,446,00
	0	
Schemes to start 2009		
Ennis Clarecastle Sewerage Scheme (H)	S	57,800,000
		57,800,000
Serviced Land Initiative		
Clarecastle Water Supply & Sewerage Scheme	W/S	5,134,000
Clonlara Sewerage Scheme	S	2,418,000
Inagh Sewerage Scheme	S	946,000
Tulla Water Supply & Sewerage Scheme	W/S	1,257,000
		9,755,000
Rural Towns & Villages Initiative		
Ballyvaughan Sewerage Scheme*	S	-
Broadford Sewerage Scheme	S	1,561,000
Corofin Sewerage Scheme*	S	-
Feakle Sewerage Scheme*	S	-
***Listed with Grouped Schemes above**		**1,561,000**
Schemes to Advance through Planning		
Castlelake Water Supply Scheme	W	21,000,000
Kilfenora Sewerage Scheme	S	840,000
Killaloe Sewerage Scheme	S	1,500,000
North Clare (Eastern Area) Water Supply Scheme	W	8,000,000
South East Clare Grouped Sewerage Scheme (Blackwater, Parkroe, Gillogue, Parteen, Athlunkard, Ardnacrusha, Larkyle, Ballycannon, Meelick, Montpelier)	S	7,601,000
		38,941,000
Water Conservation Allocation		**2,000,000**
Asset Management Study		**100,000**
Programme Total		**236,149,000**

(H) Refers to a Hub as designated in the National Spatial Strategy
(G) Refers to a Gateway as designated in the National Spatial Strategy

Attachment C.1

Description of Inagh WWTP

The Inagh WWTP was constructed in 1995/1996, and is located to the north-west of the village adjacent the River Inagh. The design population for the Inagh WWTP is 550 PE, however the WWTP is estimated to serve a population of 273 given current loadings as outlined in Table 1 hereunder. Prior to the construction of the existing foul network, the school and local authority housing were served by a combined network, which directed flows to a number of septic tanks in the area. The access route to the plant is from the Miltown Road, via a lay-by situated adjacent to the local supermarket shop.

Table 1: Design data for Inagh WWTP

Design Load	273
DWF	140 m^3/day
BOD_5 Load	16.4 kg/day

The above design was based on previous definitions of population equivalent and dry weather flow, with 60grms BOD_5 and 225 litres flow per head per day. Under 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 load for this flow, allowing 60g of BOD_5 per head of population.

Treatment Process Description

Inagh WWTP operates as an extended aeration activated sludge process, and consists of the following elements:

- Inlet Pump House
- Inlet screening, fitted with screening removal and bypass
- Aeration tank fitted with open vane surface aerators
- Clarifier
- Sludge belt press
- Administration control house

1. Inlet pump houses

The eastern section of Inagh village is served by the Church Yard pumping station and is located approximately 300 metres to the south-east of the treatment works. A 100mm rising main from this station delivers flow directly to the Inagh WWTP. Two submersible pumps are provided in the pumping station, operating on a duty/standby basis and with design pumping capacities of 10.5 and 12.1 litres/second. An overflow pipe discharges to the River Inagh in emergency situations. This wastewater discharge is a secondary discharge and is designated SW2 on the maps accompanying the application. Proposals are in place at present under the Land Serviced Initiative scheme, to replace the existing pumping station at Church yard and increase the storage capacity to 50m^3. A back up generator would also be provided and the overflow eliminated.

The Miltown Road pumping station serving housing developments to the west of Inagh has two submersible pumps with design pumping capacities of 8.5 and 8litres/second. There is no overflow facility at this pumping station, which is designated SW3 on the maps accompanying the application.

The locations of the pumping stations are indicated on the Map Attachment B-1 to this application.

2. Inlet Screening

Incoming wastewater is directed through coarse bar screens to remove solids or alternatively a screen bypass is provided to divert overflow directly to the aeration basin. The screenings are removed manually.

3. Aeration Basin.

The single aeration tank is a flat-bottomed tank, with a reactor volume of 157m^3. Aeration is provided by means of a 3kw vertical shaft aerator with a horizontal disc blade impeller and an under aerator baffle. This should provide a retention time of 1.12 days (25 hours). Two 600mm overflow weir penstocks direct flow to the two clarifiers.

4. Clarifier

There are two imhoff type clarifier tanks of 21m^3 capacity in place. The clarifiers incorporate a diffusion box, baffle plate and castellated weir plates. The final clarified effluent discharges directly via an 225mm diameter concrete pipeline to the River Inagh..A site layout map is provided as Attachment B-2 and the map indicating both the location of the treatment plant and the main discharge point to surface water is provided as Attachment B-1. The treated wastewater discharge is the primary discharge, and is designated SW1 on the maps accompanying the application. There is no storm water overflow facility from the Inagh WWTP.

5. Sludge Management

Settled sludge is drawn from the bottom of the clarifiers into the sludge processing system. Sludge can either be returned to aeration tank or transferred to the sludge treatment building. The waste sludge is processed mechanically via a "Solids Technology" belt press and screw conveyor and associated sludge thickening (using poly) equipment before being removed off site. Sludge is taken to McGill Environmental Systems (Irl) Ltd., Co. Cork for composting. The contractor removing this material is permitted under WCP/LK/047/02b WCP/LK/047/07c.

6. Administration Control House

The control room is housed in the administration building on site. The control room houses the main control panel for the treatment plant monitoring pumps and recording systems and basic office facilities provided therein. 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 domestic treatment process is shown on attachment C.1.3.

Attachment C.1.1

Stormwater Overflows

Attachment C.1.1

Stormwater Overflows

There is no stormwater overflow associated with the Inagh Wastewater Treatment Plant. There is a stormwater overflow facility associated with Church Yard Pumping Station. During long periods of pump dysfunction, or power outages, the configuration at the pumping stations is such that there is potential for overflow from the system. Normal operations of the unit, even during heavy rainfall do not result in overflow. Any such overflow discharges to the River Inagh just south of the bridge. Samples of the river were taken during the preparation of this application and results of this exercise are set out in Table F.1 (ii) a of the application form.

Attachment C.1.2

Pumping Station Information

Attachment C.1.2

Pumping Station Information

There are two pumping stations associated with the existing sewerage system in Inagh. The two pumping stations are located at

No.	Location	Ref	Grid reference
1	Church Yard	SW2	E120838; N181287;
2	Miltown Road	SW3	E120543; N181170

Church Yard Pumping Station
2 No. Submersible Pumps operating on Duty/Standby basis.
10litres/sec and 12.1litres/sec respectively.
Overflow from Pump Station to Inagh River.
No back up generator

Please note as part of Clare County Council's proposed Serviced Land Initiative scheme it is proposed to construct a new pumping station to replace the existing one at Church Yard and provide a back up generator along with increased capacity of $50m^3$.

Miltown Road Pumping Station
2 No. Submersible Pumps operating on Duty/Standby basis
8.5litres/sec and 8litres/sec respectively.
No Overflow from Pump Station.
No back up generator

Attachment C.2

Flow Records

Flow volumes at Inagh Wastewater Treatment Plant

Date 2008	Flow reading 1st of month	Flow Measurement per Month	No of Days	Average Flow Measurement m^3/day
January	407994	6306	31	203
February	414300	3569	29	123
March	417869	3745	31	121
April	421614	2339	30	78
May	423953	2613	31	91
June	426766	3507	30	117
July	430273	4276	31	138
August	434549	6527	29	225
September	441076	4399	30	147
October	445475	6293	31	203
November	451768	3658	30	122
December	455426	3511	31	113

Average flow measurement during 2008: 140m^3

Mean BOD_5 for period 2007/2008: 117 mg/l

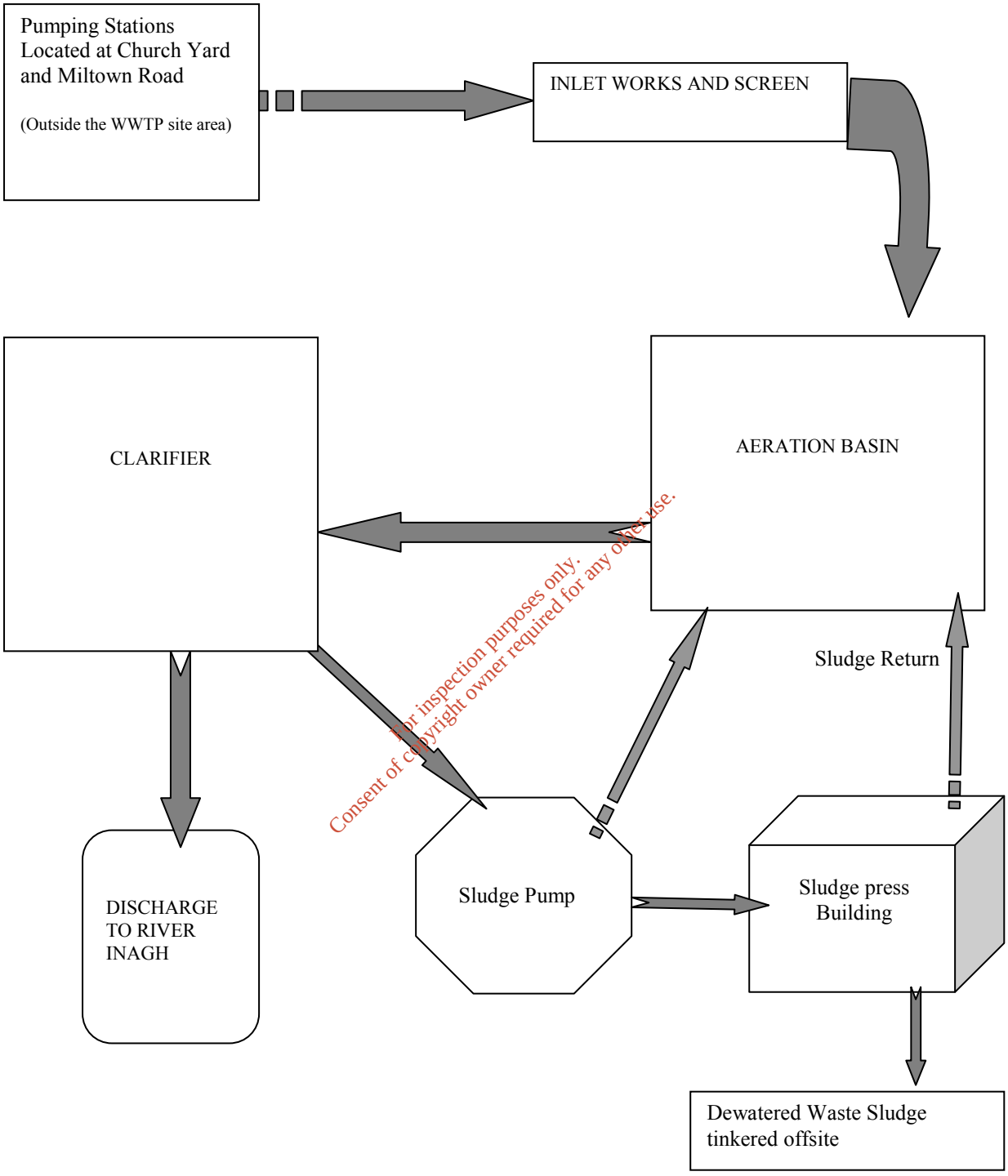
Population equivalent : 273 (using flow and mean BOD loading)

Population equivalent: 622 (based on 225 litres/head/day)

Attachment C1.3

Flow Diagram for Inagh Waste Water Treatment Plant

Flow Diagram for Inagh Waste Water Treatment Plant



Attachment E.1

Flow Records

Flow volumes at Inagh Wastewater Treatment Plant

Date 2008	Flow reading 1st of month	Flow Measurement per Month	No of Days	Average Flow Measurement m^3/day
January	407994	6306	31	203
February	414300	3569	29	123
March	417869	3745	31	121
April	421614	2339	30	78
May	423953	2613	31	91
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Average flow measurement during 2008: 140m^3

Mean BOD_5 for period 2007/2008: 117 mg/l

Population equivalent : 273 (using flow and mean BOD loading)

Population equivalent: 622 (based on 225 litres/head/day)

Attachment E.2

Sampling and Analysis Methodology

1. METHOD PRINCIPLE

The pH is the negative logarithm of the hydrogen ion concentration of a solution and is thus a measure of whither the liquid is acid or alkaline. The basic principle of electrometric pH measurement is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.

2. SAMPLING AND SAMPLE PRESERVATION

Samples should be taken in accordance with the procedures set out in the ***Laboratory Sampling Manual.***
Analyse samples within 2 hours after receiving to the lab.

3. SAFETY PRECAUTIONS

Good safety habits and laboratory techniques should be used throughout the procedure; these are outlined in the ***Laboratory Safety Manual***. Consult the Material Safety Data Sheets for information specific to the reagents used.

4. INTERFERENCES

Greasy or oily samples may cause blockage of the electrode.

5. REAGENTS

pH 4 Buffer:	pH 4 @ 25^{o}C (Reagecon , Product No. 104025C)
pH 7 Buffer:	pH 7 @ 25^{o}C (Reagecon , Product No. 107025C)
pH 10 Buffer:	pH 10 @ 25^{o}C (Reagecon , Product No. 110025)
Quality Control Solution	pH 6.865 @ 25^{o}C (Reagecon Buffer Standard 106881)
Electrode filling solution:	3M KCL (Reagecon, Product No. ESS5)

6. APPARATUS

- WTW inolab pH meter 730
- Water bath , thermostatically controlled at 25^{0}C $\pm$ 1^{0}C

7. PROCEDURE

(a) Preparation of Quality Control Sample:

- Quality Control Sample is bought in from Reagecon and is logged in the QC logbook where it gets a sequential number, this is written on the bottle.

(b) Two Point Calibration:

- Use two buffer solutions, pH 7 & pH 4 . **The temperature the buffers should be 25^0C ± 1^0C to minimize temperature correction errors. If necessary samples are placed in a 25^oC waterbath to ensure that the correct temperature is achieved prior to measurement.**
- Submerse the pH electrode in the first buffer solution pH 7
- Press the RUN ENTER key, the measured pH appears on the display
- Set the nominal pH value of the buffer solution by pressing UP and DOWN arrow keys
- Press the RUN ENTER key, the value of the asymmetery and the sensory symbol appear on the display
- Press the RUN ENTER key, SLOpe appears on the display.
- Thoroughly rinse the electrode with distilled water
- Submerse the electrode in the second buffer solution pH 4
- Press the RUN ENTER key, the second measure pH value appears on the display
- Set the nominal pH value of the second buffer solution
- Press the RUN ENTER key
  The value of the slope(mV/pH) appears on the display. (Admissible range Slope = **-50 to -62 mv/pH**).
- The sensor symbol shows the evaluation of the electrode after the two point calibration
- To return to measuring mode , Press the M key.
- Record the slope value in the instrument logbook and on worksheet.

(c) Measurement:

- Select the measuring mode by selecting M
- Rinse the pH electrode with purified water, blot dry and immerse into the first sample.
- Press the M key until pH appears in the status display.
- Activate the AR function by pressing AR (the current measured value is frozen)
- Start the autoread function by pressing RUN ENTER, AR flashes on the display until a stable value is reached, record in worksheet.
- If necessary start the next autoread function by pressing RUN ENTER
- A quality control sample must be run with each batch of analysis. (Reagecon Buffer Standard 6.865@ 25^0C) Record value of QC sample in worksheet and on QC chart and also record the temperature of QC sample.
- When measurement of samples is complete, rinse electrode in purified water, blot dry and store in 3 molar KCL solution.

8. METHOD DETECTION LIMIT/QUALITY CONTROL

The method has no quantifiable detection limit however pH values of <2 and >12 units cannot be relied due to the nature of the sample matrix/electrode response.

The Quality Control Limits are shown below:

Quality Control Target	Lower Control Limit (LCL)	Lower Warning limit (LWL)	Upper Warning limit (UWL)	Upper Control Limit (UCL)
6.88	6.81	6.84	6.92	6.95

9. EXPRESSION OF RESULTS

Report pH values to the nearest 0.1 pH unit, except the QC sample which must be reported to 2 decimal places.

10. REFERERENCES

- *Standard Methods for the Examination of Water and Wastewater, 21st edition, 2005.*
- *Clare Co .Co. Laboratory Sampling Manual*
- *Clare Co .Co. Laboratory Safety Manual*
- *Clare Co.Co. Quality Manual*
- *NS 30 A Manual for Analytical Quality Control for the Water Industry, Water Research Centre 1987*
- *WTW inoLab pH 730 operating manual.*

Clare Co.Co. Environmental Laboratory	Author: M.M^{c}N	
Test Method Manual	Issued By: MMcN	
Chemical Oxygen Demand. High Range (20-1500 mg/L O_2) Low Range (10- 150 mg/l O_2)	Issue Date: 17/02/09	
Method No. 2	Issue No:1	Page 1of 4

1. METHOD PRINCIPLE

The mg/L COD results are defined as the mg of O_2 consumed per litre of sample under conditions of this procedure. In this procedure the sample is heated for 2hrs with a strong oxidising reagent, potassium dichromate. Oxidisable organic compounds react, reducing the dichromate ion to green chromic ion (Cr3+). When the 10-150 mg/L method is used the amount of CR6+ remaining is determined. When the 20-1500 mg/L is used the amount of Cr3+ produced is determined. The COD reagent also contains silver and mercury ions. Silver is a catalyst and mercury is used to complex chloride interference's.

2. SAMPLING AND SAMPLE PRESERVATION

Samples should be taken in accordance with the procedures set out in the ***Laboratory Sampling Manual.***
Analyse samples as soon as possible after receipt to the lab otherwise refrigerate and analyse within 48 hours. If this cannot be achieved preserve samples by acidification to pH < 2 with H_2SO_4 (2mls per litre), refrigerate and analyse within 28 days.

3. SAFETY PRECAUTIONS

Good safety habits and laboratory techniques should be used throughout the procedure; these are outlined in the ***Laboratory Safety Manual.***
Vials contain sulphuric acid (86%), potassium dichromate silver and mercury. Consult Material Safety Data Sheet for information specific to the reagents used.
Wear appropriate skin and eye protection.
Vials are heated to 150^{0}C so vials and digestion rack is very hot, take suitable precautions.

4. WASTE DISPOSAL

Final samples contain mercury, silver and chromium at concentrations which are hazardous so all COD vials must be disposed of by sending to Shannon Environmental Services. The used vials are stored in the used delivery containers marked "waste" pending collection.

5 INTERFERENCES

Chloride is the primary interference when determining COD concentration. Each COD vial contains mercuric sulphate which will eliminate chloride interference up to 2000 mg/L in the sample, if the sample contains greater than this it must be diluted.

6 REAGENTS

- COD Digestion Reagent Vials, 0 – 150 mg/L (Hach Cat No. 21259-51)
- COD Digestion Reagent Vials, 0 – 1500mg/L (Hach Cat No. 21258-51)

- **Stock Quality Control (High Range Test), Potassium Hydrogen Phthalate (500 mg/L O_2) (BDH Analar 102075K):**
  Dry Potassium Hydrogen Phthalate for 1 hour at 103 ^{0}C. Dissolve 0.425g in purified water and dilute to 1 litre. Record details in the QC logbook and assign a QC number to the solution. This solution is stable when refrigerated for up to three months in the absence of visible biological growth.
- **Stock Quality Control (Low Range Test) Potassium Hydrogen Phthalate (100mg/L O_2):** Measure 200mls of the 500mg/l Stock Quality Control solution into a 1 litre volumetric flask and make up to the mark with purified water. Record details in the QC logbook and assign a number. This solution is also stable for three months if kept refrigerated.

7 APPARATUS

- Hach COD Reactor,
- Hach DR4000 Spectrophotometer

8 PROCEDURE

(1) Sample preparation:

- Turn on the COD reactor and allow to heat to 150^{0}C. When hot check thermometer in heating block and record temperature in the instrument log book.
- Choose COD vials to be used i.e. 0-150 and/or 0-1500 mg/L, put sample numbers on vials.
- Shake sample bottle vigorously to mix.
- Carefully remove the cap from vial and slowly pipette 2 mls of mixed sample into the vial. To avoid splashing pipette 2mls of diluted sample if dilutions are required. Put on the cap and mix by gentle inversion a few times.
- A blank of purified water and a Quality Control sample must be run with each test. If doing a high range test use the 500mg/L Quality Control Solution; if doing the low range test use the 100mg/L Quality Control solution.
- Place the vials in the COD reactor and set timer for 2 hours.
- Following 2 hours digestion, the reactor switches off automatically, wait approx. 20 minutes before removing the vials from the reactor. Carefully remove the vials, invert a few times and place on metal rack for cooling. Allow to cool to room temperature and measure.

(2) Sample measurement:

- Switch on the spectrophotometer and press the soft key under HACH PROGRAM. Select the stored programme number, **2710 for low range test**, **2720 for high range test**

- Press {ENTER}. The wavelength is automatically selected.
- Insert the test tube adapter into the sample cell module by sliding it under the thumbscrew and into the alignment grooves. Fasten with the thumbscrew.
- Clean the outside of the blank with a soft tissue.
- Place the blank into the adapter with the Hach logo facing the front of the instrument. Close the light shield.
- Press the soft key under ZERO, the display will show: 0 mg/L COD.
- Clean the outside of the sample vial with a soft tissue. Place the vial in the adapter with the Hach logo facing the front of the instrument. Close the light shield. Results in mg/L COD will be displayed. Record results on the COD worksheet and record QC on worksheet and on relevant QC chart.

9 METHOD DETECTION LIMIT (M.D.L.) & QUALITY CONTROL

Low Range Test.

Method Detection limit. **M.D.L.** **mg/L O_2**	**Quality Control Low Range test** **mg/L O_2**	**Lower Control Limit** **(LCL) mg/L O_2**	**Lower Warning limit** **(LWL) mg/L O_2**	**Upper Warning limit** **(UWL) mg/L O_2**	**Upper Control Limit** **(UCL) mg/L O_2**
10	**100**	**85**	**90**	**110**	**115**

High Range Test:

Method Detection limit. **M.D.L.** **Mg/L O_2**	**Quality Control High Range test** **mg/L O_2**	**Lower Control Limit** **(LCL) mg/L O_2**	**Lower Warning limit** **(LWL) mg/L O_2**	**Upper Warning limit** **(UWL) mg/L O_2**	**Upper Control Limit** **(UCL) mg/L O_2**
20	**500**	**460**	**475**	**525**	**540**

10. EXPRESSION OF RESULTS

- Results are reported as mg/L O_2. For the low range test results are reported to 1 decimal place, for the high range test results that are in the range 20 – 1000 are reported to two significant figures and results > 1000 mg/L O_2 are reported to three significant figures.

11. REFERENCES

- *Standard Methods for the Examination of Water and Wastewater, 21st edition.*
- *Clare Co .Co. Laboratory Sampling Manual*
- *Clare Co .Co. Laboratory Safety Manual*
- *Clare Co.Co. Quality Manual*
- *NS 30 A Manual for Analytical Quality Control for the Water Industry, Water Research Centre 1987*

1. METHOD PRINCIPLE

The method consists of filling with diluted and seeded sample, to overflowing , an airtight bottle of specified size and incubating it at 20^0C for 5 days. Dissolved oxygen is measured initially and after incubation and the BOD is computed from the difference between initial and final DO.
A factor which must be borne in mind in obtaining and assessing B.O.D. results is nitrification. This is the oxidation of ammonia to nitrate by nitrifying bacteria and if the process is occurring under test conditions high oxygen uptake values will be recorded. For normal river waters the onset of nitrification conditions does not occur within the 5 day period but in the case of wastewaters containing nitrifying organisms this phenomenon will take place much more promptly and unless nitrification is inhibited the result is an apparently very high B.O.D. level.

2. SAMPLING AND SAMPLE PRESERVATION

Samples should be taken in accordance with the procedures set out in the ***Laboratory Sampling Manual.***
If analysis is begun within 2 hrs of collection cold storage is unnecessary if not, keep sample refrigerated before analysis. Analyse sample within 24h of collection. Warm chilled samples to 20°C
$\pm$ 3^0C .

3. SAFETY PRECAUTIONS

Good safety habits and laboratory techniques should be used throughout the procedure; these are outlined in the ***Laboratory Safety Manual.***

4. INTERFERENCES

Samples containing caustic alkalinity or acidity must be neutralised to pH 6.5 to 7.5 with a solution of Sulphuric acid or Sodium hydroxide to pH 6.5 to 7.5 of such strength that the that the quantity of reagent does not dilute the sample by more than 0.5%.

5. REAGENTS

- **B.O.D. nutrient powder pillows** (Hach Prod.Code:14861-98)
- **Quality Control Solution :** Glucose Glutamic Acid Standard Soln
- **Allythiourea (BDH analar,104622A)**
- **TCMP ?**
- **Seed (diluted mixed liquor)**

6. APPARATUS

- Incubator @ 20 ^{0}C $\pm$ 1^{0}C
- Incubation bottles, 250 to 300 mls capacity
- Water bath , thermostatically controlled at 20^{0}C $\pm$ 1^{0}C
- Dissolved Oxygen Meter

7. PROCEDURE

(A) Preparation of Quality Control solution:

- Dry Glucose (BDH, Analar grade 10117Y) and reagent grade Glutamic acid (BDH Biochemical 371064E) at 103^{0}C for 1 hr. Allow to cool in a dessicator.
- Dissolve 0.15g Glucose and 0.15g Glutamic acid distilled water and dilute to 1litre in a volumetric flask. Mix well. Prepare fresh immediately before use. Store all Glucose/Glutamic mixtures at 4^0 C or lower. Record in the QC log book and assign a QC number

(B) Preparation of Reagents.

- **Source Water for Sample Dilution :** A quantity of distilled water is aerated overnight, on the day of the test 1 BOD nutrient powder pillow is added to 3 litres water.
- **Allylthiourea** (Nitrification Inhibitor): This is used if analysing samples that require nitrification inhibition e.g. Wastewater Treatment Plant samples. Dissolve 0.2g of Allythiourea (BDH analar,104622A) in 150 mls purified water and make up to 200mls in a volumetric flask. This solution is stable for up to two weeks if kept refrigerated. Record preparation in the back QC logbook.
- **SEED**

(C) Preparation of Blanks, Samples & Quality Control:

Samples both diluted and undiluted , dilution water blanks and Quality Control Samples should be treated in the same way. All samples must be brought to 20^{0}C $\pm$ 3^0 C before D.O. measurement.

Preparation of Dilution Water Quality Check Blanks:

- Two blanks must be run with each set of analysis, which contain nutrient, mineral and buffer solution but no seed or nitrification inhibitor , this serves as a check on quality of unseeded dilution water and cleanliness of incubation bottles. The DO uptake should should not exceed 0.2mg/L.
- for blank determination the prepared dilution water is treated as a sample. Place prepared dilution water into pre - labeled BOD bottles. Fill the BOD bottle to overflowing with sample. Remove any entrapped air bubbles by gently tapping the bottle.
- If using a nitrification inhibitor, add 1ml of Allythioura solution per 500 mls sample, two ATU blanks must be prepared and treated in the same way as the samples.
- Place the BOD bottles in the water-bath until ready for D.O. measurement.

Preparation of Quality Control Samples:

- At least two QC samples must be run with each set of analysis, this is prepared by diluting the Glucose/Glutamic Standard solution by 50 with the dilution water in a volumetric flask or graduated cylinder. Place prepared QC sample into pre - labeled BOD bottles. Fill the BOD bottle to overflowing with sample. Remove any entrapped air bubbles by gently tapping the bottle.
- If using a nitrification inhibitor, add 1ml of Allythioura solution per 500 mls QC sample.
- Place the BOD Bottle in the water- bath until ready for D.O. measurement.

Preparation of Samples:

- Some samples may require dilution , if the BOD is expected to be greater than 7mg/l O_2 then the sample requires dilution . Make at least two dilutions of prepared sample estimated to produce a residual DO of at least 1.0 mg/L and a DO uptake of at least 2.0 mg/L.(Use dilution chart in Appendix 1 as reference).
- Prepare dilution by adding desired amount of sample to a 500 mls Class A Graduated Cylinder (For dilution greater than 1:100 make a primary dilution first.
- Add X mls of seed and (nitrification inhibitor) solution per 500 mls diluted sample
- Label BOD bottles with No. of sample, dilution and date.

Shake vigorously and pour into BOD bottle (this is to ensure that sample is saturated with oxygen).

- Fill the BOD bottle to overflowing with sample. Remove any entrapped air bubbles by gently tapping the bottle.
- Samples must be brought to 20^0C in a water-bath before DO measurement, after preparing dilution measure initial DO within 30 min.

(D) Calibration of Dissolved Oxygen Meter.

NEW SECTION

(E) Measurement of DO in Samples /Blanks and Quality Control Sample

- Insert the funnel and stirrer into the BOD bottle to be measured, insert the electrode into the bottle. Ensure that there are no air bubbles trapped on the electrode head. Allow the DO reading to stabilise, the sample when fully saturated at 20^0C should read between 8.8 to 9.2 mg/l. Record the DO_1 for the blanks, QC and samples on the worksheet. Rinse the probe between sample measurement.
- Put the glass top on the bottle, ensure that no air bubbles are trapped. Seal with parafilm to prevent evaporation. Place the BOD bottle in the incubator for 5 days.
- After 5 days remove the BOD bottle from the incubator and record the DO_5 remaining on the worksheet.
- Record samples with inhibition and without inhibition of separate worksheets. Samples with inhibitor added must be recorded as CBOD (Wastewater Treatment Plant Samples)

8. **CALCULATIONS:**

- The DO remaining in the bottle after 5 days should be greater than 2 mg/l and there should be a DO depletion of at least 2mg/l to accept results.
- If more than 1 sample dilution meets the above criteria average results in the acceptable range, this applies to the QC samples, blanks and diluted samples.
- The BOD of the blank should be < 1 mg/l O_2, values of greater than this should be checked for possible sources of contamination. Protect water quality by using clean glassware, tubing and bottles.
- The calculations are done using an excel worksheet (BOD calculation worksheet) as follows:

1. Always open the master worksheet blank to input data in the following filename/path: *T:\Environment/lab /lab/Excel Graphs Ammonia, BOD Calculations/BOD Calculations /Calculation Template.*
2. Enter all sample values obtained for DO_1 and DO_5 and dilutions used. The calculations are automatically done. Remember not to accept results if there is < 2.0 mg/l O_2 left in the bottle or if there is an uptake of < 2mg/l O_2. The results that are not acceptable will be highlighted. Results, which are highlighted, must be excluded from the final average value.
3. Do not save onto this sheet. All data should be saved in Work in Progress file (WIP)/Year /Month of analysis/ and saved under test date and initials of analyst. Differentiate between the results for BOD & CBOD.
4. Always open the master sheet. Never modify a previously used data sheet.
5. Print the sheet and attach to the worksheet and place in results folder. Initial hand written raw data and computer print out.
6. The calculation used in the excel sheet is as follows:

Undiluted Samples:	**Diluted Samples:**
DO1 – DO5 = BOD mg/l O_2	**F X { (DO_1 – DO_5)} – {(F-1)/F X (B_1 – B_5)=BOD mg/L O_2.**
DO_1= Initial DO of sample *DO_5 = DO of sample after 5 days incubation*	*F = Dilution Factor, DO_1 = Initial DO of diluted sample* *DO_5 = DO of diluted sample after 5 days incubation* *B_1 = Initial DO of blank, B_5 = DO of blank after 5 day incubation.*

9. **METHOD DECTECTION LIMIT (M.D.L.) & QUALITY CONTROL**

Method Detection limit. **M.D.L. Mg/l O_2**	**Quality Control**	**Lower Control Limit** **(LCL) mg/l O_2**	**Lower Warning limit** **(LWL) mg/l O_2**	**Upper Warning limit** **(UWL) mg/l O_2**	**Upper Control Limit** **(UCL) mg/l O_2**
2	**200**	**150**	**165**	**235**	**250**

10. EXPRESSION OF RESULTS

Results should be reported in accordance with the following table:

Concentration	Method of Reporting	Example
< 10 mg/l O_2	Report to nearest integer	8.3 measured report as 8
10 – 1000 mg/l O_2	Report to 2 significant figures	106.3 measured report as 110
> 1000 mg/l O_2	Report to 3 significant figures	1244 measured, report as 1240

Note: If Nitrification is inhibited results should be reported as CBOD mg/l O_2 otherwise report as BODmg/l O_2

11. REFERERENCES

- *Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005 APHA,.AWWA,WEF*
- *Clare Co .Co. Laboratory Sampling Manual*
- *Clare Co .Co. Laboratory Safety Manual*
- *Clare Co.Co. Quality Manual*

Appendix 1 : Dilution Table

Diln Factor	BOD Range	Dilution 1		Dilution 2		Dilution 3	
		Sample Vol (mls)	Make up to (mls)	Vol of Dil 1(mls)	Make up to(mls)	Vol of Dil 2 (mls)	Make up to (mls)
1:2	4 – 14	200	400				
1:3	6 – 21	150	450				
1:4	8 – 28	100	400				
1:5	10 – 35	80	400				
1:10	20 – 70	40	400				
1:15	30 – 100	30	450				
1:20	40 – 140	20	400				
1:30	60 – 200	15	450				
1:40	80 – 280	10	400				
1:50	100 – 350	10	500				
1: 100	200 –700	10	100	40	400		
1: 200	400 – 1400	10	100	20	400		
1 :400	800 – 2800	10	100	10	400		
1: 500	1000 – 3500	10	100	10	500		
1 : 800	1600 – 5600	10	200	10	400		
1 : 1000	2000 – 7000	10	500	20	400		
1 : 2000	4000 – 14000	10	500	10	400		
1 : 4000	8000 – 28000	25	500	10	500	100	400

NOTE:

- From dilutions 1:2 to 1:50 dilutions are made up in 500 mls graduated cylinder
- From dilutions 1:100 to 1:4000 a serial dilution is done where first dilution is made in volumetric flask and second dilution is made in graduated cylinder
- The table above is an aid to estimate the dilutions to use. As a general guideline use the following dilutions:
  1/100 to 1/20 for raw and settled wastewater and 1/5 for biologically treated effluent. If the biologically treated effluent is of bad quality use the dilutions that are generally used for raw wastewater.

1. METHOD PRINCIPLE

The procedure consists of filtering a well mixed sample through a weighed glass–fibre paper (grade GF/C with particle retention of 1.2um) and the residue on the filter is dried at 103 to 105^0C. The increase in the weight of the filter represents the total suspended solids.

2. SAMPLING AND SAMPLE PRESERVATION

Samples should be taken in accordance with the procedures set out in the ***Laboratory Sampling Manual.***
Samples must be refrigerated to minimize microbiological decomposition of solids and analyzed within 7 days.

3. SAFETY PRECAUTIONS

Good safety habits and laboratory techniques should be used throughout the procedure; these are outlined in the ***Laboratory Safety Manual.***

4. INTERFERENCES

Exclude large floating particles if it is determined that their inclusion is not representative.
For samples high in dissolved solids e.g. chloride, thoroughly wash the filter to ensure removal of the dissolved material.

5. REAGENTS

Kaolin Quality Control Sample (200mg/L): Weigh 0.200g of Kaolin (Aldrich 22,883-4) dilute to 1litre in a volumetric flask with purified water. Mix well. Record in QC log book and assign number.

6. APPARATUS

- 1 litre Buchner flask
- **GF/C Whatman filter papers (90mm)**
- Oven for operation at 103 to 105 ^{o}C
- Analytical Balance
- Dessicator

7. PROCEDURE

(a) Preparation of GF/C Filter Papers

- Insert numbered GF/C filter paper with wrinkled side up into filtration apparatus.
- Apply vacuum and wash filter paper with 3 successive 20 mls portions of purified water. Continue suction to remove all traces of water and discard washings.
- Remove filter and dry in an oven at 103 to 105^{0}C for 1 hour.
- Cool in a dessicator to balance temperature and weigh, record of the worksheet. Store in dessicator until needed.
- A pre-weighed, numbered filter paper is required for each sample and QC sample.

(b) Sample Analysis

- Prepare Quality Control Sample as above. At least one Quality Control sample must be run with each batch of samples. Use 250mls of Quality Control sample per determination.
- Place numbered pre-weighed filter paper on filter apparatus, wash with a small volume of purified water to seat it.
- Ensure sample is well mixed, pour a volume of the well-mixed sample onto the filter paper (the volume chosen depends on the concentration of solids in the sample e.g. up to 500 mls can be filtered for samples of low suspended solids content and less than 100 mls samples are used if there is a high suspended solids content).
- Wash with three successive 10 ml volume of purified water and allow complete drainage between washings. Samples with high dissolved solids may require additional washings. Continue suction for about 5 minutes after filtration is complete.
- Record the volume filtered on the worksheet.
- Carefully remove the filter from the apparatus place in the oven for 1 hour at 103 to 105^{0}C.
- Remove from oven, cool in dessicator and weigh, record final weight on worksheet and do calculations below. Record value of QC sample on QC chart.

8. CALCULATIONS/RESULTS

- The Total Suspended Solids is calculated as follows:

$$\text{mg/L: Total Suspended Solids} = \frac{(A - B) \times 1{,}000{,}000}{\text{Sample Volume (ml)}}$$

A: Weight of filter plus dried residue (g)
B: Weight of filter (g)

- Report results as mg/L SS to three significant figures.

9. METHOD DETECTION LIMIT (M.D.L.)/ QUALITY CONTROL

Method Detection limit. M.D.L mg/l SS	Quality Control Target mg/l SS	Lower Control Limit (LCL) mg/l SS	Lower Warning limit (LWL) mg/l SS	Upper Warning limit (UWL) mg/l SS	Upper Control Limit (UCL) mg/l SS
2	190	175	180	200	205

10. REFERERENCES

- *Standard Methods for the Examination of Water and Wastewater, 21st edition.*
- *Clare Co .Co. Laboratory Sampling Manual*
- *Clare Co .Co. Laboratory Safety Manual*
- *Clare Co.Co. Quality Manual*
- *NS 30 A Manual for Analytical Quality Control for the Water Industry, Water Research Centre 1987*

Attachment E.4

Inagh WWTP Monitoring Results 2007/2008

Inagh WWTP Monitoring Results 2007/2008

Date	BOD		COD		Suspended Solids	
	Influent	Effluent	Influent	Effluent	Influent	Effluent
18/0107	18	3	54	15	32	29
22/02/07	72	3	94	14	28	12
16/05/07	56	118	65	>150	31	81
29/06/07	31	22	65	50	28	56
19/07/07	286	17	238	42	60	18
09/08/07	Nm	Nm	325	80	86	54
05/09/08	308	26	411	52	157	31
03/10/07	38	30	94	103	110	28
07/11/07	158	9	261	15	148	14
05/12/07	34	6	58	23	890	34

Date	BOD		COD		Suspended Solids	
	Influent	Effluent	Influent	Effluent	Influent	Effluent
16/0108	62	2	138	16	46	8
25/03/08	62	2	407	22	183	4
21/04/08	372	53	652	124	271	61
29/05/08	213	9	296	11	58	8
18/06/08	118	6	184	25	46	10
01/07/08	56	16	95	40	40	15
16/09/08	78	26	82	62	26	30
14/10/08	32	13	61	22	37	2

Attachment E.5

Monitoring Data Storage and Reporting

Clare County Council Environmental Laboratory

To: Claire Cremin

From: Maura McNulty

Date: 26/05/09

Re: Reporting Monitoring results at Kilkishen WWTP

- Wastewater monitoring and analysis at the WWTP is carried out by the environmental technician based at the Sixmilebridge WWTP.
- Monthly results of influent and effluent at the WWTP are reported into the LABINFO system.
- All of the results recorded in LABINFO are sent to the EPA at the end of the year to be published in the EPA report on Urban Wastewater Discharges in Ireland.
- Operational monitoring results at the plant are stored at the Council Offices. A monthly report of performance of the WWTP is sent to the Senior Engineer, Senior Executive Engineer, Executive Engineer in Water Services and to the Senior Executive Chemist and Executive Scientist in Environment.

Regards

Maura McNulty
Executive Scientist

Attachment F.1

Impact on Receiving Water

Impact of emissions from the Inagh WWTP on the River Inagh

The impact of discharges from the Inagh WWTP on the receiving waters of The Inagh Inagh is considered under a number of headings:

(i) Description of receiving waters
(ii) Statutory Designations of the Receiving Waters
(iii) Assimilative capacity of the receiving waters
(iv) Total maximum nutrient load discharging to receiving waters
(v) Monitoring undertaken on receiving waters
(vi) Impact of storm overflows
(vii) Proposed technology for improving emissions from WWTP

(i) Description of receiving waters

The Inagh WWTP discharges to the River Inagh, which is included in the catchment of the Shannon River Basin and in the EPA hydrometric and biological monitoring programs (Code 28I01). The river rises in the foothills of Slieve Callan and drains into the River Inagh Estuary, which is a Special Area of Conservation (SAC) (Code 000036) at Ennistymon. The river is approximately 30 kilometres long and has a catchment area of 168 km^2. The upper reaches of the catchment comprise primarily of peat bogs, coniferous forest and woodland scrub while the lower regions are well draining agricultural lands. The Inagh catchment area includes a number of main tributary rivers, namely the Aughaglanna River (Code 28A06) which drains into the Inagh River upstream of the Inagh, the Aillenabrockagh River (Code 28_631) which flows in a westerly direction and drains into the Inagh River downstream of Inagh and a third main tributary (Code 28_87) which flows in an easterly direction draining into Drumcullaun Lough before draining into the Inagh River.

The nearest downstream abstraction point of water for potable supply is a private Groundwater supply at Russ Hill (GW7/2) approximately 6.4 kilometers away and a second private Groundwater supply at Lavereen, which is approximately 8.3 kilometres away. A public water supply abstraction point at Lough Keagh (CW22), is located approximately 10 kilometres on the western boundary of the catchment.

The river water quality at both the Bridge at Inagh (Site No. 0200) and at Monanagh Bridge (Site No. 0300) are classified with a Q value of 3-4 in the most recent monitoring conducted in 2007 as outlined in Table 1 below. The overall interim water quality status for the Inagh Catchment has been classified by the EPA as Good with the exception of the immediate sub-catchment areas to the east, south-east and north-east of Inagh, which have been classified as High water quality status.

Table 1 River Inagh Monitoring 1985 – 2007

	EPA						CS		
Site No	**1985**	**1988**	**1991**	**1997**	**2000**	**2003**	**2005**	**2006**	**2007**
0100	5	4-5	4-5	5	4-5	4	4-5	5	-
0200	5	4-5	4	4	4	4	4	3-4	3-4
0250	-	3-4	4	-	-	-	-	-	-
0300	4-5	4	4	4	4	4	3-4	3-4	3-4
0450	-	-	-	4	3	4	3-4	4	-

EPA: Environmental Protection Agency; CS: Conservation Services

(ii) Statutory designations of the Inagh River

There are no sites designated as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) or Natural Heritage Areas (NHAs) in the vicinity of the Inagh WWTP.

(iii) Assimilative capacity of receiving waters

Estimates of total effluent discharge volumes and associated nutrient loads are used to assess the likely impact of the discharge from the Inagh WWTP on the river water quality in the Inagh. The catchment area at station 0200, at the bridge in Inagh, which is 325m upstream of the Inagh WWTP, is 65km^2. The nearest downstream flow monitoring station on the Inagh River is located at Ennistymon (Station No. 28001). The 95%ile flow (F_{95}) and 50%ile flow (F_{median}) at this station are 0.21m^3/s and 2.45m^3/s respectively, however these flows relate to a larger catchment area of 168km^2 (OPW hydrometric data). Basing the calculation on a catchment area proportion basis, the F_{95} and median (F_{median}) flows at the Inagh WWTP can be estimated as 0.08m^3/s and 0.948m^3/s. The dry weather flow (DWF) is 0.06m^3/s (EPA hydrometric data). These values, together with the discharge volume from the Inagh WWTP are used to assess the assimilative capacity of the Inagh River for the discharge from the treatment plant. The full assimilative capacity calculation is provided in Attachment F1.1 to this application.

Consideration of the nutrient loading to the waters from the Inagh WWTP and integrating this data with the existing water quality indicates that there is adequate assimilative capacity for the discharge from the facility for all parameters with the exception of BOD. It is noted that during DWF conditions, the assimilative capacity consumed by the discharge per day is 153% for the parameter BOD. Similarly at 95%ile flow conditions the assimilative capacity consumed by the discharge per day is 115% for the parameter BOD. While the results of physio-chemical monitoring of the Inagh River, which commenced in April 2007 in accordance with the WFD Monitoring Programme, at a site approximately 375m downstream of the Inagh WWTP, indicate that the background level for BOD has not increased, the results for this site show that the 95%percentile is 2.9 and is not in compliance with the proposed EQSs for High or Good Status Sites, as outlined in the Draft European Communities Environmental Objectives (Surface Waters) Regulations published in September 2008. The existing discharge at the Inagh WWTP will be subject to a schedule of improvement works, which will include upgrading and refurbishment to provide for increased capacity for new developments in the Inagh agglomeration, should the Land Serviced Initiative Scheme proceed. Further comment will be made on the results associated with the monitoring over the past 23 months, under Section 8.5 hereunder.

(iv) Total maximum nutrient load discharging to the Inagh River

Analytical data for the wastewater discharge from the Inagh WWTP is available of the effluent streams over several years. The influent and effluent streams are monitored for biochemical oxygen demand (BOD), chemical oxygen demand (COD), and suspended solids (SS). Results for 2007 and 2008 are used for this application.
Flow data for the influent load to the plant is recorded monthly. These flow records indicate the range of flow volumes through the system is 78 - 225 m^3/day, however much higher flow data has been recorded on occasion during heavy rainfall episodes. The calculation of discharge load uses the average flow data readings over the period January to December 2008 to present the typical discharge load from the facility. This

approach takes account of the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007 in relation to calculation of population equivalent, *"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* - 16 - *biochemical oxygen demand (BOD5) 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"*

The discharge of the treated waste stream is used to assess the impact of the discharge on the receiving waters for biochemical oxygen demand (BOD) chemical oxygen demand (COD) and suspended solids (SS) to waters. The nutrient discharge load is synopsised in Table 2, based on the estimated maximum flow readings and mean analytical values for the dates presented.

Table 2: Estimated nutrient load from Inagh WWTP to the Inagh River

Date	*BOD (kg/day)*	*COD (kg/day)*	*SS (kg/day)*
16/01/2008	0.3	2.2	1.1
25/03/2008	0.3	3.1	0.6
21/04/2008	7.4	17.4	8.5
29/05/2008	1.3	1.5	1.1
18/06/2008	0.8	3.5	1.4
01/07/2008	2.2	5.6	2.1
16/09/2008	3.6	8.7	4.2
14/10/2008	1.8	3.1	0.3
Average	2.2	5.6	2.4

Average flow = 140m^3/day; SS; suspended solids; BOD: biochemical oxygen demand; COD: chemical oxygen demand;

(v) Monitoring undertaken on receiving waters

Physio-chemical monitoring of the Inagh River commenced in April 2007 in accordance with the WFD Monitoring Programme, at a site along the N85 approximately 750metres downstream of the bridge at Inagh (Station No. 0210) and at Monanagh Bridge (Station No. 0300). The results indicate compliance with the proposed EQSs for Good Status Sites with the exception of the results for the parameter BOD - (Good Status ≤1.5(mean) or ≤2.6 (95%percentile)) and for Ammonia (Good Status ≤0.065(mean) or ≤0.140 (95%percentile)) at the sampling point immediately downstream of the WWTP (Site No. 0210). It is noted however that the overall interim water quality status as classified by the EPA, is Good status downstream of the WWTP.

The median MRP values for waters in the Phosphorus Regulations are correlated with biological quality ratings, or Q values. The results also show compliance with Q5 (Class A) or unpolluted water quality with the standard defined for molybdate reactive phosphate (MRP) under the *Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus Regulations) S.I. 258 of 1998.* The median MRP concentration for the Site No.0210 Bridge on N85 750m downstream of the outfall from the Inagh WWTP is 0.015mg/litre. Similarly at Monanagh Bridge Site No. 0300, the median MRP concentration is 0.012mg/litre.

Biological quality monitoring (Q rating) in accordance with the *Local Government (Water Pollution) Act 1977 Water Quality Standards for Phosphorous Regulations, 1998* is undertaken on a national basis by the E.P.A. Clare County Council also commission Conservation Services to undertake biological monitoring of surface waters. The most recent Q-values recorded in 2007, Q3-4, have not changed from the previous monitoring in 2006 for the site at Monanagh Bridge (Site No. 0300).

Clare County Council, during the course of preparing the application for a discharge authorisation**,** under the *Wastewater Discharge (Authorisation) Regulations 2007, (S.I No 684 of 2007)* for the Inagh WWTP, to the EPA assessed the Inagh agglomeration to identify any facility liable to generate substances listed in Annex X of the Water Framework Directive (2000/60/EC) or relevant pollutants listed in Annex VIII of the Water Framework Directive. Monitoring for these substances was undertaken in April 2009 and results on this monitoring do not indicate any substance on the list was present in the waters of the Inagh River or in the discharges to the river from the Inagh WWTP, with the exception for the parameters Toluene and Xylenes, which have elevated levels in the ambient downstream sample from the Inagh WWTP (see Annex 1). No potential source of these pollutants has been identified in the sewer catchment, and the source of the listed substances in the ambient downstream sample is unclear. The substances were not observed in the discharge sample. Results from the survey will be collated and included in the licence application data as soon as may be on receipt of the results of the sampling exercise.

The monitoring programs described above provide a good overview of the water quality status in the Inagh River, both upstream and downstream of the WWTP discharge. The quality of the existing discharge and associated nutrient loads present a limited risk of pollution to water quality in the Inagh River. Any increase in the Inagh agglomeration will be restricted unless the proposed Land Serviced Initiative Scheme and associated upgrading and refurbishment of the Inagh WWTP are implemented. These proposals will cater for an increased loading of up to 1850 PE over a projected 25 year period. The Council has already acquired lands adjacent to the existing WWTP for the proposed upgrading of the treatment works and a Part VIII planning application was lodged with the Planning Department in 2008. In March 2009, approval was given to proceed with the development. In conclusion, there is no indication of significant deterioration in quality status of the Inagh River downstream of the discharge from the treatment plant.

(vi) Impact of storm overflows

A storm overflow is located at the Church Yard pumping station. During long periods of pump dysfunction, or power outages, the configuration at the pumping stations is such that there is potential for overflow from the system. Normal operations of the unit, even during heavy rainfall do not result in overflow. Any such overflow discharges to the River Inagh just south of Inagh Bridge. Sampling of this drain was undertaken on April 14th 2009, during the course of preparing the licence application. Results from the survey will be collated and included in the licence application data as soon as may be on receipt of the results of the sampling exercise. No complaints have arisen in connection with this overflow. Proposals are in place at present under the Land Serviced Initiative scheme, to replace the existing pumping station at Church yard and increase the storage capacity to $50m^3$. A back up generator would also be provided and the overflow eliminated.

There is no storm overflow from the pumping station on the Miltown Road.

(vii) Proposed technology for improving emissions from WWTP

Pursuant to Clare County Council's Water Services Investment Programme 2007-2009 Clare County Council are proposing the expansion and upgrading of the wastewater treatment facilities for the Inagh WWTP and associated pumping stations stations, to cater for the projected loading arising in the agglomeration. A Preliminary Report was carried out by consultants RPS in March 2008 and is with the Department Of Environment Heritage & Local Government for comment. A Part VIII planning application was lodged with the Planning Department in 2008. In March 2009, approval was given to proceed with the development. Initial proposals for the phase 1 development had a completion date of 2010, however a scheduled commencement date is not agreed as yet.

The proposed development provides for the expansion of the existing Inagh Wastewater Treatment plant. The expansion will occur to the west of the existing WWTP. It is proposed to expand the wastewater treatment facilities in two phases from a current 550PE (Population Equivalent) to 1200PE. The second phase will increase the PE further from 1200PE to 1850PE. The sewer network will be designed to carry a hydraulic load of 6DWF. The project will also involve the construction of a new pumping station to replace the existing one at Church Yard and to provide a back up generator along with increased capacity of $50m^3$. The overflow facility from the existing pumping station will be decommissioned. Phosphorous removal will be necessary in the design criteria to reduce P levels. The Total P and N levels in the effluent stream may need to be reduced further in the future and allowance will be made for this reduction at design stage. The outfall from the WWTP will be to the adjacent Inagh River and access to the site will be via the existing lane, which connects the public road to the site.

Attachment F 1.1

Assimilative Capacity of Receiving Water

Assessment Of The Inagh River to Determine The Indicative Assimilative Capacity For Treated Wastewater For A Proposed Upgrade of the Waste Water Treatment Plant At Inagh, Co. Clare

For the Attention of:
Mr. Joe Maguire
Clare County Council
Ennis
Co. Clare

Prepared by:
Mr. Cormac O'Sullivan
Senior Environmental Consultant

Reviewed by:
Ms. Lisa Blyth
Projects Manager

Report No.: ECS 2481_PhaseII
Date: August 2007

Executive Summary

Bord na Móna Technical Services was commissioned by Clare County Council to undertake an assessment of the Inagh River to determine the indicative assimilative capacity for treated wastewater discharge from a proposed upgrade of the existing wastewater treatment plant at Inagh, Co. Clare. An Environmental Consultant from Bord na Móna visited the site on the 30th May 2007, 11th July 2007, 1st August 2007 and again on the 14th August 2007 to undertake the assessment.

The baseline water quality of the River Inagh, as assessed through the four monitoring events, both upstream and downstream of the existing wastewater treatment plant discharge, is of good quality with the majority of parameters within their respective limits. The results of analyses were compared to the European Communities (Quality of Salmonid Waters) Regulations, 1988 (SI no.293 of 1988), the EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations and the Local Government (Water Pollution) Act 1977 (Water Quality Standard for Phosphorus) Regulations. One parameter, Total Coliforms, was outside its respective limit, with concentrations in both upstream and downstream sampling locations in exceedence of the limit for A1 waters under the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989.

With regard to orthophosphates, the indicative assimilative capacity calculations based on flows on the 11th July 2007 and on an increase in the specification standard of treatment, shows that orthophosphate concentrations would increase from 0.01 mg/l to 0.016mg/l which would result in the waters remaining unpolluted under the Phosphorus Regulations. However under the calculated low flow conditions, the orthophosphates would increase from 0.01 to 0.07mg/l which equates to going from unpolluted to moderately polluted waters. All other parameters would remain within their respective EQS's for surface waters.

There are two sets of data for the 95%ile flow conditions of the Inagh River at Ennistymon. Because of this uncertainty, a low flow based on 1l/sec/km^2 of catchment area for the calculation of the assimilative capacity was used.

The historical database of physico-chemical water quality for orthophosphates for the Inagh River is up to January 2005. The most recent set of results in accordance with the Third Schedule of the Phosphorus Regulations, shows the median orthophosphate concentration as being 0.01mg/l, which is consistent with results obtained during the four sampling events carried out for this study.

A summary calculation shows that the Inagh River would be able to assimilate a discharge of 720 P.E. in low flow conditions without causing a decline in water quality above the new proposed EQS for orthophosphates in surface waters.

If flow metering equipment was installed on the existing plant to quantify the usage of domestic wastewater, it may be that usage is less than the 180 litres per person per day and closer to the 120 litres per person per day, as suggested by recent EPA publications. If that were the case, the Inagh River would be able to assimilate 1,080 P.E. during times of low flow without raising the orthophosphate concentrations above proposed new EQS for surface waters.

Submitted by,

Mr. Cormac O'Sullivan	Ms. Lisa Blyth
Senior Environmental Consultant	Projects Manager

Table of Contents

SECTION 1: INTRODUCTION

Bord na Móna Technical Services was commissioned by Clare County Council to undertake an assimilative capacity assessment of the Inagh River at Inagh, Co. Clare. It is proposed to upgrade an existing wastewater treatment plant which is currently discharging treated effluent to the Inagh River. The plant has a capacity for 550 P.E. and the proposed upgrade is to discharge treated effluent for 2,000 P.E. to the Inagh River.

Environmental Consultants from Bord na Móna visited the site on the 31st May, 11th July, 1st August and again on the 14th August 2007 to undertake the following:

- A comprehensive macroinvertebrate survey;
- A physiochemical water quality assessment; and
- A flow measurement programme at various sampling stations throughout the local surface water system.

This report details the methodologies involved in the study, the analytical techniques used, the results of measurements and analysis and an interpretation of these findings with respect to the likely impact of the proposed development on the receiving waters.

SECTION 2: SITE CHARACTERISATION

2.1 Site Location

The current point of discharge is in the village of Inagh, approximately 300m downstream of Inagh Bridge (See Figure 2.1 below). The current wastewater treatment plant is serving 550 P.E. and the proposal is to upgrade the plant to a higher specification of treatment and to cater for 2,000 P.E., depending on the findings of this study.

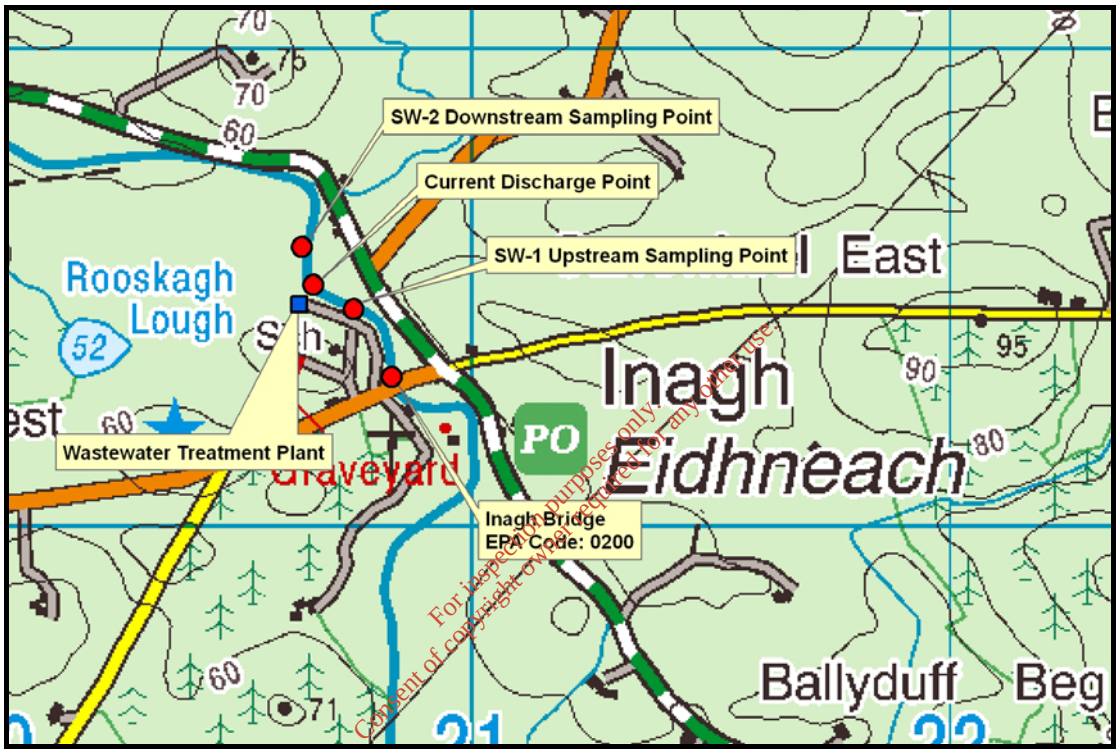


Figure 2.1 – Location of Study Area and Sampling Points

2.2 Prevailing Hydrological Conditions

The Inagh River rises in Slievecallan Mountain and a number of small loughs; Rosconnell Lough, Rushaun Lough, Islandgar Lough, Lough Corroe, Redmeadow Lough, Lough Burke, Lough Bougha, Derrygarve Lough, Derrynacarragh Lough and Cloontabonniv Lough. The River flows through the village of Inagh and the town of Ennistymon and then to sea. The Inagh River is part of Hydrometric Area 28, river code 28I01. The river is part of the EPA's National Biological Monitoring Programme and has one monitoring point upstream at Inagh Bridge (Station No:0200) and two monitoring points downstream at Moanannagh Bridge (Station No:0300) and at 0.2km upstream of Ennistimon (Station No: 0450). The most recent assessment available (2003) rated each of the sites as Unpolluted (Q4)

SECTION 3: SCOPE OF THE SURVEY

In order to determine the assimilative capacity of the river for the proposed upgrade, a baseline survey was undertaken. This survey incorporated an assessment of the prevailing water quality conditions through monitoring of the river upstream and downstream of the existing discharge point. Environmental Consultants visited the site on four occasions between the 31st May and the 14th August 2007 to undertake the assessment of the proposed receiving watercourse.

3.1 *Sampling Locations*

In order to yield a representative indication of surface water quality of the relevant surface water body upstream of the existing discharge point and downstream of the discharge point, and assess the impact of the proposed upgrade, if any, on the receiving watercourse, a total of 2 no. monitoring stations were sampled on four occasions. The surface water sampling locations are described below in Table 3.1. and are shown in Plate 1 and Plate 2

TABLE 3.1: LOCATION OF SURFACE WATER SAMPLING POINTS

Sample Point	Location	Justification
SW1	Sample extracted 100m upstream of the existing discharge	To determine the surface water quality upstream of the existing discharge point
SW-2	Sample extracted 150m downstream of existing discharge	To determine the surface water quality downstream of the existing discharge point.

Plate 1: SW-1, upstream sampling location on the Inagh River.

Plate 2: SW-2, downstream sampling location on the Inagh River.

3.2 Surface water sampling

The study was split into three sections:

- Physical parameters;
- Chemical parameters; and
- Biological attributes.

Physical parameters

An assessment of the flow within the stream was undertaken using a Flo-Mate™ portable flowmeter (Marsh-McBirney Inc.). The meter utilises a solid-state electromagnetic sensor whereby voltage amplitude produced by passing water is linear and proportional to the water velocity flowing around the sensor. This flow meter allows flow velocity readings to be taken at discrete points within a water body to an accuracy of 10^{-3} m/s. Flow readings were taken at regular intervals across the stream at various depth intervals. Each reading was taken in triplicate to allow the average flow rate to be calculated. It is noted that these flow readings are representative of single instances in time only and should not be taken as definitive hydrometric data.

Chemical parameters

Samples of representative surface waters were collected using standard grab sampling procedures. All samples returned to the laboratory were stored at 2-8°C. Subsequent analysis of all samples was carried out in strict accordance with recognised standard methods as detailed in Table 3.2 overleaf.

TABLE 3.2: ANALYSIS OF SURFACE WATER SAMPLES	
Parameter	**Method**
pH (pH units)	Based on APHA,1998, 20TH Edition, Method 4500 H+B. (G/05)
Flow (m/S)	In Situ, a Flo-Mate™ portable flowmeter
Conductivity (µS/cm)	Based on APHA,1998, 20TH Edition, Method 2510B. (G/06)
BOD (mg/l)	Based on APHA, 1998, 20TH Edition, Method 5210-B. (G/04)
Total Suspended Solids (mg/l)	Based on APHA – 1998, 20TH Edition, 2540D. (G/19)
Ammonia NH_3-N (mg/l)	Konelab colourimetric analysis (G/67)
Total Phosphorus (mg/l)	Persulphate digest followed by colourimetric analysis
Total Nitrogen (mg/l)	Based on ENV 12260 1996
Sulphate (mg/l)	Based on Konelab
Chloride (mg/l)	Based on G67 Konelab
Orthophosphate (mg/l)	G/67 based on APHA, 1998, 20th Edition, 4500-P.E. Ascorbic Acid Method.
Nitrate as N (mg/l)	G/67 Based on APHA 1998, 20th Edition, 4500-NO2B, colorimetric method
Nitrite as N (mg/l)	G/67 Based on APHA 1998, 20th Edition, 4500-NO2B, colorimetric method
Total Coliforms	MPN based on IDEXX defined substrate method
e.Coli	G/72 MPM based on IDEXX defined substrate method

G/ ILAB Accredited Method, Bord na Móna Environmental & Analytical Services Standard Operating Procedures Manual based on ASTM & APHA standard methods

APHA Standard Methods for Examination of Water and Wastewater.

Biological attributes

Field sampling procedures were conducted in accordance with the USEPA 'Revision to Rapid Bio-assessment Protocols for Use in Streams and Rivers (1997)' in addition to procedures detailed in S.I No. 258 of 1998, an amendment to the Local Government (Water Pollution) Act, 1997. A D-frame dip net was used to sample benthic macroinvertebrates at the sampling location on the receiving watercourse. Dimensions of the frame were 0.3 m width and 0.3 m height and shaped as a "D" where the frame attaches to a long pole. The net was a cone shape for capture of organisms. Sampling began at the downstream end of the reach and proceeded upstream at representative areas and within riffle/run areas if possible. A kick sample was taken for two minutes. Larger substrate particles were picked up and rubbed by hand to remove attached organisms. In addition, individual stones and rocks were picked from the stream bottom and inspected. Attached organisms were collected into the composited sample. The sample was returned to the laboratory and sorted. All organisms were identified to the

lowest possible taxonomic level. All samples are held in the laboratory for 6 months after the issue of the report

Habitat, as structured by in-stream and surrounding topographical features, is a major determinant of aquatic community quality. Both the quality and quantity of available habitat affect the structure and composition of resident biological communities. As such, on site habitat characteristics were recorded and referenced to results obtained from the sample.

3.3 Biological Quality Rating (Q-Rating)

This is a Pollution Rating Index, which has been developed to measure the response of certain key macroinvertebrate species or groups to pollution. The Q-Rating system has been implemented by the Environmental Protection Agency in Ireland as the standard means to assess the quality of any part of a stream based principally on the composition of macroinvertebrate communities/faunal groups present and their general sensitivity to organic pollution. The Biological Quality Rating forms part of S.I No. 258 of 1998, an amendment to the Local Government (Water Pollution) Act, 1977. The rating system recognises five macroinvertebrate groups ranging from A to E (i.e. most sensitive to most tolerant) and relates their relative abundance, from a standard 2 minute sample, to a quality rating known as a Q Index. The part of the stream or river surveyed may subsequently be assigned a Q rating from 5 to 1 (i.e. pristine, unpolluted to grossly polluted). Table 3.3 presents Part I of the First Schedule of S.I No. 258 of 1998 which groups the macroinvertebrate indicator groups. Table 3.4 presents Part II of the First Schedule of S.I No. 258 of 1998, which relates the Biological Q Rating and the five faunal groups. Table 3.5 quantifies the various abundance categories.

Table 3.3

Biological Quality Rating System for Rivers

Part 1

Indicator Groups: Key Taxa

Macroinvertebrate Communities/Faunal Groups and their General Sensitivity to Organic Pollution

Group A *Sensitive*	**Group B** *Less Sensitive*	**Group C** *Tolerant*	**Group D** *Very Tolerant*	**Group E** *Most Tolerant*
Perlidae	Leuctridae	Tricladida	Hirudinea	Tubificidae
	Nemouridae	Ancylidae	Mollusca	
Chloroperlidae	Taeniopterygidae	Neritidae	(excl. Ancylidae,	
			Margaritiferidae,	*Chironomus*
	Baetidae	Unionidae	Neritidae &	
Capniidae	Leptophlebiidae	Astacidae	Unionidae)	
	Ephemerellidae			
Perlodidae	Ephemeridae	*Gammarus*	*Asellus*	
	Potamanthidae	Caenidae	Chironomidae	
Heptageniidae	Cased Trichoptera	Limnephilidae	(excl. Chironomus	
	(excl. Limnephilidae	Hydroptilidae	& Rheotanytarsus)	
Siphlonuridae	Hydroptilidae &	Glossosmatidae		
Margaritiferidae	Glossosomatidae)	Uncased Tricoptera		
	Odonata (excl.	Coleoptera		
	Coenagriidae)	Coenagriidae		
		Salidae		
		Tipulidae		
	Aphelocheirus	Simulidae		
	Rheotanytarsus	Hemiptera		
		(excl.		
		Aphelocheirus)		
		Hydracarina		

Table 3.4: Relationship between Biological Quality Rating/Index (Q) and the Five Faunal Groups

	Q Index	Faunal Group				
		A	**B**	**C**	**D**	**E**
Eroding Substrata (i.e. the shallower, fast-flowing areas)	Q5	#	#	++	+/-	+/-
	Q4	++	#	<	++	+/-
	Q3	-	+/-	#	<	++
	Q2	-	*	+/-	#	<
	Q1	-	-	-	+/-	#
			-			
		(excl. *B rhodani* which may be dominant)				
Depositing Substrata (i.e. the deeper, slower-flowing areas)	Q5	++	#	<	++	++
	Q4	+/-	<	#	++	++
	Q3	-	-	++	<	<
	Q2	-	-	-	<	<
	Q1	-	-	-	-	#

= numerous or dominant < = Common ++ = Present in small numbers
+ = Scarce +/- = Scarce or absent - = absent

Table 3.5 - Quantification of Macroinvertebrates Abundance Categories

Abundance	**Approximate Frequency of Occurrence**	
Category	**Number***	**Percentage**
One	1	-
Scarce/few	2 - 5	<1%
Present in small numbers	6 - 10	<5%
Present in fair numbers	11 - 20	5 - 10%
Common	21 - 50	10 - 20%
Numerous	51 - 100	25 - 50%
Abundant/Dominant	100 - 200	50 - 75%
Superabundant/Excessive	200+	>75%

3.4 Quality Control

INAB ACCREDITATION:

Bord na Móna Technical Services' analytical laboratories were awarded INAB accreditation by the National Accreditation Board (NAB) in 1997. It has always been the policy of the laboratories to achieve and maintain a high standard of quality consistent with client's requirements in all aspects of the work carried out within the laboratory.

NAB as a member of the International Laboratory Accreditation Cooperation (ILAC) and the European Co-operation for accreditation (EA) has adopted ISO 17025 as the new standard for its laboratory accreditation programme since January 2002.

This new standard contains all of the requirements that testing laboratories have to meet if they wish to demonstrate that they operate a quality system, are technically competent, and are able to generate technically valid results. ISO 17025 incorporates all those requirements of ISO 9000 that are relevant to the scope of testing services that are covered by the laboratory's quality system. Thus a laboratory that complies with ISO 17025 will therefore also operate in accordance with ISO 9000.

Bord na Móna Technical Services analytical laboratory successfully transferred to ISO 17025 on 16th of November 2001.

Interlaboratory Proficiency Schemes

To ensure the accuracy of the analytical testing Bord na Móna Environmental participates in several external proficiency schemes. The ongoing competence of the laboratory and its staff is assessed by participation in various inter-laboratory proficiency testing schemes, such as Aquacheck and the EPA scheme organised for environmental laboratories throughout Ireland.

EPA Quality Control Register

Bord na Móna Technical Services Analytical Laboratories performance in the EPA intercalibration scheme has ensured its listing on the EPA's register of Quality Approved Laboratories.

Quality Control Audits

Bord na Móna Environmental Ltd. consistently strives to improve the quality of the analytical work carried out in its laboratories. The laboratory has a full time Quality Control Manager who assists in the organisation and execution of the extensive programme of internal Quality Audits. These quality audits examine all aspects of the

laboratory's Quality System, with particular focus on auditing of test methods, and enable potential problems to be highlighted and immediate corrective action to be taken.

Controlled Chain of Custody:

As part of the Quality System in place in Bord na Móna, Environmental Ltd., measures are taken to ensure controlled chain of custody. An outline of the chain of custody is given below.

BORD NA MÓNA

BORD NA MÓNA ENVIRONMENTAL LIMITED

CONTROLLED CHAIN OF CUSTODY

SITE	TRANSPORT	LABORATORY
Sampling and packaging of all samples were carried out by Bord na Móna Technical Team Mr. Cormac O'Sullivan Mr. Sean Creedon	Transport Document Form → Transport to laboratory by Bord na Móna Technical Team.	Sample Reception Form → Receiving of samples at Bord na Móna Environmental Laboratory complex by: Ms. Sharon McGuiness, Laboratory Manager (Secure laboratory complex access to authorised personnel only) ↓ Storage of all samples for 1 month period after report issue. ↓ Supervised Disposal

3.5 Assimilative Capacity Calculations

Assimilative Capacity calculations form a link between receiving water quality standards and the quality of effluent to be discharged, since these calculations indicate the total amount of waste which may be accommodated safely at each discharge location.

Calculations are normally based on an assessment of potential increases in background concentrations in the receiving waterway for parameters being targeted. The individual parametric levels are assessed in accordance with their normal background concentrations found in the stream against proposed discharge concentrations from the treatment facility. All calculations will be based on the following:

$$\text{Conc. Increase} = \frac{Q_D C_D + Q_B C_B}{Q_{D+B}}$$

Where:
Q_D = Maximum Discharge flow per day
C_D = Parameter Concentration in Discharge
Q_B = Background flow conditions
C_B = Parameter Background Concentration
Q_{D+B} = Total flow in System

3.7 Review Of Clare County Council Physico-Chemical and Biological Databases for the Inagh River

As Local Authorities routinely monitor water quality of the main watercourses in their area, Clare County Council Environment Department supplied historical physico-chemical and biological data for the Inagh River at Inagh Bridge. The inclusion of this dataset was designed to compliment the four sampling events carried out for this study. Physico-chemical data was supplied for the Inagh River up to January 2005. Subsequent sampling of the river was carried out for biological assessment. As the database for the Inagh River is up to January 2005, there is no 'live' physico-chemical dataset for the watercourse. Nevertheless it is possible to use the entire dataset to show the historical trend in water quality upstream of the point of discharge. As Orthophosphate is the key limiting nutrient in terms of freshwater systems, and there are prescribed limits under the Phosphorus Regulations for Orthophosphate with regard to water pollution, this parameter was used for the purpose of this study. The Q Rating was used post-January 2005.

SECTION 4: PRESENTATION OF RESULTS

4.1 General Quality of the Receiving Watercourse Upstream of Existing Discharge

Table 4.1.1 Flow Rates of the Receiving Watercourse Upstream of The Existing Discharge	
Location	**SW1**
Flow (m^3/day)	56,937

Note 1: These results show the flow as recorded on the 11th July 2007

Table 4.1.2 Analytical Results for the Receiving Watercourse Upstream of the Existing Discharge					
PARAMETER	**31/5/07**	**11/7/07**	**1/8/07**	**14/8/07**	***Limit (see notes)***
pH (pH units)	7.9	8.3	7.6	7.4	*6-9* [1]
BOD (TCMP) mg/l	<2	2	2	<2	*3* [2]
Conductivity	190	168	189	169	*1,000* [1]
Total Phosphorous mg/l	0.06	<0.05	<0.05	0.08	-
Suspended Solids mg/l	<5	-	<5	<5	*25* [1]
Ammonia as N mg/l	0.05	<0.02	0.03	0.03	*0.77* [1]
Total Nitrogen as N mg/l	<1	1.03	1.01	<1	-

Table 4.1.3 Anion, Cation and Microbial Results for the Receiving Watercourse Upstream of the Existing Discharge					
PARAMETER	**31/5/07**	**11/7/07**	**1/8/07**	**14/8/07**	***Limit (see notes)***
Chloride mg/l	31	25	24	22	*250* [2]
Ortho-Phosphate as P mg/l	<0.01	0.01	<0.01	0.01	*0.03* [3]
Nitrate as N mg/l	<0.2	<0.2	<0.2	<0.2	*11.29* [2]
Nitrite as N mg/l	<0.02	<0.02	<0.02	<0.02	*0.0152* [1]
Sulphate mg/l	8.64	7.1	4.19	3.14	*200* [2]
Total Coliforms MPN/100mls	**104,624**	--	**6,770**	440	*5,000* [2]
Faecal Coliforms MPN/100mls	185	--	124.2	<1	*1,000* [2]

NOTES ON TABLES 4.1.2 & 4..1.3

1. European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988)
2. European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations S.I. No. 294 of 1989)- Limits for A1 waters given.
3. Local Government (Water Pollution) Act, 1977, (Water Quality Standard for Phosphorus) Regulations, 1998 – limit given is for Unpolluted Waters (Quality rating Q4)

Figures in bold are those that exceed their respective limit

4.2 General Quality of the Receiving Watercourse Downstream of The Existing Discharge

Table 4.2.2 Analytical Results for the Receiving Watercourse Downstream of the Existing Discharge					
PARAMETER	**31/5/07**	**11/7/07**	**1/8/07**	**14/8/07**	***Limit (see notes)***
pH (pH units)	7.9	8.1	7.5	7.4	*6-9* [1]
BOD (TCMP) mg/l	<2	2	2	<2	*3* [2]
Conductivity	193	172	187	170	*1,000* [1]
Total Phosphorous mg/l	0.1	<0.05	<0.05	0.07	-
Suspended Solids mg/l	<5	-	7	<5	*25* [1]
Ammonia as N mg/l	0.3	0.03	0.04	0.03	*0.77* [1]
Total Nitrogen as N mg/l	<1	1.04	1.00	<1	-

Table 4.2.3 Anion and Cation Results for the Receiving Watercourse Downstream of the Existing Discharge					
PARAMETER	**31/5/07**	**11/7/07**	**1/8/07**	**14/8/07**	***Limit (see notes)***
Chloride mg/l	32	25	25	22	*250* [2]
Ortho-Phosphate as P mg/l	0.02	<0.01	<0.01	0.01	*0.03* [3]
Nitrate as N mg/l	<0.2	<0.2	<0.2	<0.2	*11.29* [2]
Nitrite as N mg/l	<0.02	<0.02	<0.02	<0.02	*0.0152* [1]
Sulphate mg/l	8.33	7.9	4.26	3.59	*200* [2]
Total Coliforms MPN/100mls	**241,920**	-	**9,000**	**3,300**	*5,000* [2]
Faecal Coliforms MPN/100mls	123.3	-	224.7	<1	*1,000* [2]

NOTES ON TABLES 4.1.2 & 4.1.3

1. European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988)
2. European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations S.I. No. 294 of 1989)- Limits for A1 waters given.
3. Local Government (Water Pollution) Act, 1977, (Water Quality Standard for Phosphorus) Regulations, 1998 – limit given is for Unpolluted Waters (Quality rating Q4)

Figures in bold are those that exceed their respective limits

4.3. Results Of Clare County Councils Historical Physico-chemical And Biological Database For the Inagh River.

Table 4.3.1 below shows the Orthophosphate concentrations for the Inagh River on 43 monitoring occasions from January 2001 to January 2005 at Inagh Bridge.

Table 4.3.1 Orthophosphate Concentrations of the Inagh River at Inagh Bridge from January 2001 to January 2005

Date	OrthoP (mg/l) as P	Date	OrthoP (mg/l) as P
30/1/2001	0.01	24/4/2003	0.01
22/2/2001	0.03	22/5/2003	0.03
28/3/2001	0.01	19/6/2003	0.01
31/5/2001	0.01	17/7/2003	**0.05**
28/6/2001	**0.07**	14/8/2003	0.01
12/10/2001	**0.06**	11/9/2003	0.01
1/11/2001	0.02	9/10/2003	0.01
22/11/2001	0.02	6/11/2003	0.01
12/12/2001	0.01	3/12/2003	0.01
30/1/2002	0.03	25/2/2004	0.01
28/2/2002	**0.06**	25/3/2004	0.01
4/4/2002	0.01	21/4/2004	0.03
8/5/2002	**0.08**	19/5/2004	0.01
5/6/2002	0.03	16/6/2004	0.01
7/8/2002	0.03	20/7/2004	0.02
4/9/2002	0.01	24/8/2004	0.01
1/10/2002	0.01	22/9/2004	0.01
5/11/2002	0.02	20/10/2004	0.01
4/12/2002	0.01	17/11/2004	0.01
29/1/2003	0.01	14/12/2004	0.023
25/2/2003	0.02	28/1/2005	0.01
27/3/2003	0.01	**Average**	0.021
Median Orthophosphate of last twelve consecutive results = **0.01mg/l**			

NOTE ON TABLE 4.3

Figures in bold are those that exceed the limit for unpolluted waters (0.03mg/l) under the Local Government (Water Pollution) Act, 1977, (Water Quality Standard for Phosphorus) Regulations, 1998

Table 4.3.2 overleaf shows the biological assessments from 1998 to 2006.

Table 4.3.2 Biological Ratings of the Inagh River at Inagh Bridge						
River	**Sampling Location**	**Baseline**	**1998 - 2000**	**2001 - 2003**	**2005**	**2006**
Inagh	Bridge at Inagh	Q4	Q4	Q4	Q4	Q3-4

SECTION 5: INTERPRETATION OF RESULTS

5.1 Interpretation of the general water quality of the receiving watercourse.

The pH of the Inagh River at both upstream and downstream locations was between 7.4 and 8.3 which are within the limits of 6 – 9 mg/l. The BOD at both sampling locations was either at the limit of detection of 2mg/l, or below it, on all four sampling events. Nitrate and Nitrite at both sampling locations on all four sampling events were below their respective limits of detection. The orthophosphate levels upstream of the discharge from the existing waste water treatment plant were 0.01mg/l or less on all four sampling events. Downstream of the discharge the orthophosphate level was 0.02mg/l on one occasion and was 0.01mg/l or below the limit of detection on all other sampling events. However, the concentrations of Orthophosphate at both locations on all sampling events were well within the limit for unpolluted waters of 0.03mg/l under the Phosphorus Regulations. All other parameters were within their respective limits with the exception of Total Coliforms (on two sampling events upstream and on three sampling events downstream) exceeding the limit for A1 waters under the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989.

5.2 Interpretation of results to determine the impact of the proposed effluent discharge on the River Inagh during measured flow conditions

Assimilative Capacity calculations form a link between receiving water quality standards and the quality of effluent to be discharged, since these calculations indicate the total amount of waste which may be accommodated safely at each discharge location.

Calculations are normally based on an assessment of potential increases in background concentrations in the receiving watercourse for parameters being targeted.

A treatment assumption of a BOD: Suspended Solids ratio of 10:10, with a Nitrate concentration of 9mg/l and an Orthophosphate concentration of 1 mg/l was assumed.

Based on the Environmental Protection Agency's wastewater treatment manuals and assuming 180 litres per person discharged per day, it is possible to calculate the volume of treated waste water discharged per day that the stream can assimilate. For the purpose of calculations, the peak discharge flow from the wastewater treatment facility for the proposed development is 360m^3 per day (2,000 P.E.).

Calculations are based on the measured flow on the 11th July 2007 for the assimilative capacity of the Inagh River for a proposed discharge for 2,000 P.E. treated to BOD: Suspended solids ratio of 10:10 with a Nitrate concentration of 9mg/l and an Orthophosphate concentration of 1mg/l.

For each parameter, the concentration as recorded upstream of the existing point of discharge on the Inagh River is used in the following formula:

Where:

Q_D =	Maximum Discharge flow per day (360 m^3/day)
C_D =	BOD Concentration in Discharge (10 mg/l)
Q_B =	Background flow conditions (56,937m^3/day)
C_B =	BOD Background Concentration (2mg/l)
Q_{D+B} =	Total flow in System (57,297 m^3/day)
Y =	Resultant BOD concentration

$$Y = \frac{(360)\,(10) + (56{,}937)\,(2)}{57{,}297}$$

$$Y = 2.05 \text{ mg/l}$$

Therefore with a P.E. of 2,000, the predicted maximum background concentration of BOD from the stream is 2.05 mg/l during the recorded flow conditions. Applying the same formula to the other parameters, Table 5.1 illustrates the results of the Assimilative Capacity calculations on the chosen indicator parameters for the stream during the measured flow conditions.

TABLE 5.1: EFFECTS OF PROPOSED WASTEWATER DISCHARGE ON THE INAGH RIVER BASED ON THE MEASURED FLOW ON 11TH JULY 2007

Parameter	Background concentration in stream[Note1] (mg/l)	Concentration in Proposed Wastewater discharge (mg/l)	'New' [Note 2] concentration in stream after discharge (mg/l)	Water Quality Standard[Note3] (mg/l)
BOD	<2	10	2.05	3
Suspended Solids	<5	10	5.03	25
Orthophosphate	<0.01	1	0.016	0.03
Nitrate as N	<0.2	9	0.25	11.29

Note 1: Concentrations as recorded from SW-1 on 11th July 2007. Where the value was below the limits of detection, the limit of detection was used.

Note 2: 'New' indicates the proposed discharge concentration and the background concentration combined.

Note 3: Water Quality Standard = European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. 293 of 1988). The standard adopted for Orthophosphate as set out in SI No. 258/1998: Local Government (Water Pollution) Act 1977 (Water Quality Standard for Phosphorus) Regulations, 1998, is for Q4 unpolluted waters. Of note is that 0.045 mg/l is classed as slight pollution; 0.07 mg/l is moderate pollution and 0.1 mg/l is heavy pollution.

Calculations were based on the measured flow on the 11th July 2007 for the assimilative capacity of the Inagh River for a proposed discharge for 2,000 P.E. treated to BOD: Suspended solids ratio of 10:10 with a Nitrate concentration of 9mg/l and an Orthophosphate concentration of 1mg/l. Table 5.1 demonstrates that all parameters are within their respective limits under the measured flow conditions.

5.3 Interpretation of results to determine the impact of the proposed effluent discharge on the River Inagh during low flow conditions

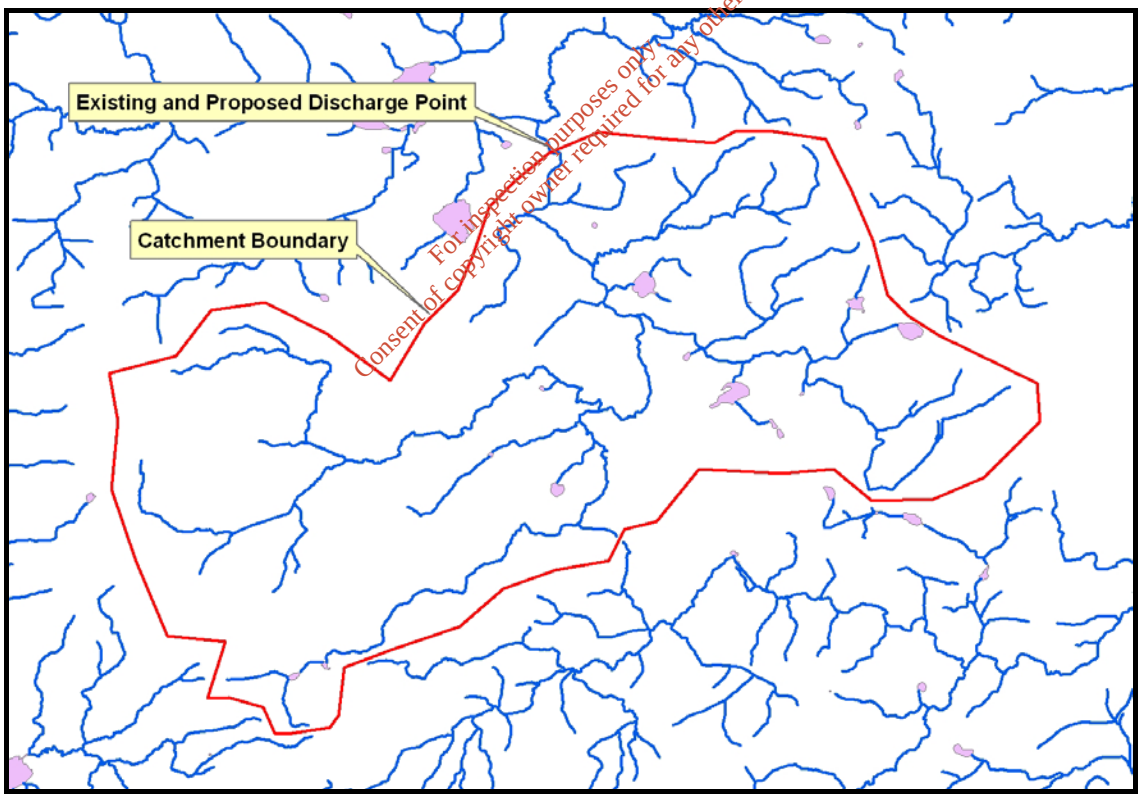
The key aspect to any assimilative capacity study is the predictive effect of the discharge on the water quality in the receiving watercourse during low flow conditions. The Inagh River is a gauged watercourse and has a hydrometric station downstream at Ennistymon. Therefore there is data available for the River at this point. Two methods will be used to calculate the low flows for the Inagh River at Inagh

Method 1 Applying The Percentage Principle

The measured flow of the Inagh River on the 11th July 2007 at SW-1 was 56,937m^3/day. The measured flow at Ennistymon, 13kms downstream, on the same day, was 311,040m^3/day (Data supplied by the OPW). The 95%ile flow at Ennistymon is given as 0.21m^3/sec which equates to 18,144m^3/day. This represents 5.8% of the measured flow on the 11th July 2007. Applying this percentage to the measured flow at Inagh at SW-1, the calculated 95%ile flow for Inagh is 3,302m^3/sec.

Method 2 – 1litre/sec/km^2 of catchment rule

Cork County Council Draft Guidelines on Assimilative Capacity Assessments (June 2006) has given the rule of 1 l/sec / km^2 of catchment as a general rule of thumb for 95%ile flow where there is no low flow data present for the watercourse. This method is generally accepted to estimate the DWF and using this flow it is a more stringent calculation of the assimilative capacity of a watercourse.



Given that the calculated catchment size of the Inagh River to Inagh Village is 61.4km^2, this equates to 61.4l/sec or 5,304.96m^3/day.

Of note is that the lowest flow is the measured flow for the 11th July 2007. Given the higher than normal levels of rainfall in June and July leading up to the flow measurement, it would appear that there maybe some degree of error in back calculating from the nearest hydrometric station in this case or else the flow data for the Inagh River at Ennistymon may not be the most accurate.

The latter maybe the case as the two datasets that are held for Hydrometrics in Ireland (EPA and OPW) have two separate figures for the 95%ile flow of the river. The published EPA data states that the 95%ile flow data for the Inagh River at Ennistymon is 0.12m^3/sec. The published OPW data states that the 95%ile flow for the Inagh River at the same point as being 0.21m^3/sec.

Given that the 1l/sec/km^2 rule is generally accepted as being closer to the DWF, this figure is applied for the calculation of low flows. Applying this figure to the formula

Where:

Q_D = Maximum Discharge flow per day (360 m^3/day)
C_D = BOD Concentration in Discharge (10 mg/l)
Q_B = Background flow conditions (5,305m^3/day)
C_B = BOD Background Concentration (2mg/l)
Q_{D+B} = Total flow in System (5,665 m^3/day)
Y = Resultant BOD concentration

$$Y = \frac{(360)\,(10) + (5{,}305)\,(2)}{5{,}665}$$

$$Y = 2.5 \text{ mg/l}$$

Therefore with a P.E. of 2,000, the predicted maximum background concentration of BOD from the stream is 2.5 mg/l during the recorded flow conditions. Applying the same formula to the other parameters, Table 5.2 overleaf, illustrates the results of the Assimilative Capacity calculations on the chosen indicator parameters for the stream during low flow conditions.

TABLE 5.2: EFFECTS OF PROPOSED WASTEWATER DISCHARGE ON THE INAGH RIVER BASED ON THE CALCULATED LOW FLOW FOR THE RIVER INAGH AT INAGH VILLAGE

Parameter	Background concentration in stream[Note1] (mg/l)	Concentration in Proposed Wastewater discharge (mg/l)	'New' [Note 2] concentration in stream after discharge (mg/l)	*Water Quality Standard*[Note3] *(mg/l)*
BOD	<2	10	2.5	*3*
Suspended Solids	<5	10	5.3	*25*
Orthophosphate	<0.01	1	**0.07**	*0.03*
Nitrate as N	<0.2	9	0.76	*11.29*

Note 1: Concentrations as recorded from SW-1 on 11th July 2007. Where the value was below the limits of detection, the limit of detection was used.

Note 2: 'New' indicates the proposed discharge concentration and the background concentration combined.

Note 3: Water Quality Standard = European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. 293 of 1988). The standard adopted for Orthophosphate as set out in SI No. 258/1998: Local Government (Water Pollution) Act 1977 (Water Quality Standard for Phosphorus) Regulations, 1998, is for Q4 unpolluted waters. Of note is that 0.045 mg/l is classed as slight pollution; 0.07 mg/l is moderate pollution and 0.1 mg/l is heavy pollution.

Note: Figures in Bold are those that exceed their respective Water Quality Standard

Median Flow Rates

There has been some debate in recent times about using median flows for the calculation of the assimilative capacity of a watercourse. This has arisen out of An Bord Pleanala decision (PL04.214469, AnBP, April 2006) where median flows were used when orthophosphate concentrations were available based on the Third Schedule of the Phosphorus Regulations.

In this case there is no 'live' dataset of orthophosphate concentrations for the Inagh River. Based on the most recent set of data available (up to January 2005) there was twelve consecutive samples in the twelve months to January 2005. The median orthophosphate concentration for this period was 0.01mg/l.

Based on the flows for the 11th July 2007 and the median orthophosphate concentrations, if the median flows for the Inagh River at Ennistymon were used (68% of the flow on the 11th July 2007), a calculation would show that the

orthophosphate concentrations would increase from 0.01mg/l to 0.019mg/l, which is still within the limit of 0.03mg/l for unpolluted waters.

However as mentioned, this cannot be relied upon due to the orthophosphate data not being live and up to date. Furthermore, the issue of using median flows would appear to be flawed as the flows for any particular watercourse would be below the median flow for 4 – 6 months of the year, thereby creating eutrophication problems due to orthophosphate concentrations being above 0.03mg/l.

5.4 Impact Assessment Using Historical Database

From Table 4.3, we see that the average historical orthophosphate concentrations of the River Inagh at a point 300m upstream of the existing discharge was 0.021mg/l from January 2001 to January 2005. Whilst this dataset is not 'live' it does indicate what the trend in water quality was like over a 4 year period. Of the 43 samples taken in that period, the background orthophosphate concentrations exceeded the limit of 0.03mg/l for unpolluted waters, on 5 occasions.

However, under the Third Schedule of the Phosphorus Regulations, where the figure of 0.03mg/l for unpolluted waters is derived from, it states that the concentration of orthophosphate is based on the median concentration using a minimum of ten samples taken at intervals of four weeks or longer in any twelve consecutive month period.

With this in mind and looking at Table 4.3 and working backwards from the most recent sample (28th January 2005) Table 5.2 below shows the median concentrations for consecutive twelve month periods.

Table 5.2 Median Orthophosphate Concentrations of the Inagh River at Inagh Bridge from January 2001 to January 2005

Period	Median Orthophosphate (mg/l) as P
25th Feb '04 – 28th Jan '05	0.01*
29th Jan '03 – 3rd Dec '03	0.01*
30th Jan '02 – 4th Dec 02	0.025**

* Twelve samples used for the calculation in the twelve month consecutive period.

** Eleven samples used for the calculation in the twelve month consecutive period even though March 2002 was not sampled.

The period from January 2001 to December 2001 was not included as it did not have 10 samples in the twelve month period. The months of April, July, August and September were missing, and even though two samples were obtained in November nine samples are not sufficient for calculation of the median in line with the Phosphorus Regulations.

As can be seen the median orthophosphate concentration was 0.01mg/l for the periods from January 2003 through to January 2005. For the period from January 2002 to December 2002, it was 0.025mg/l. Figure 5.1 over leaf shows the orthophosphate concentrations and the number of exceedences above the 0.03mg/l limit under the Phosphorus Regulations.

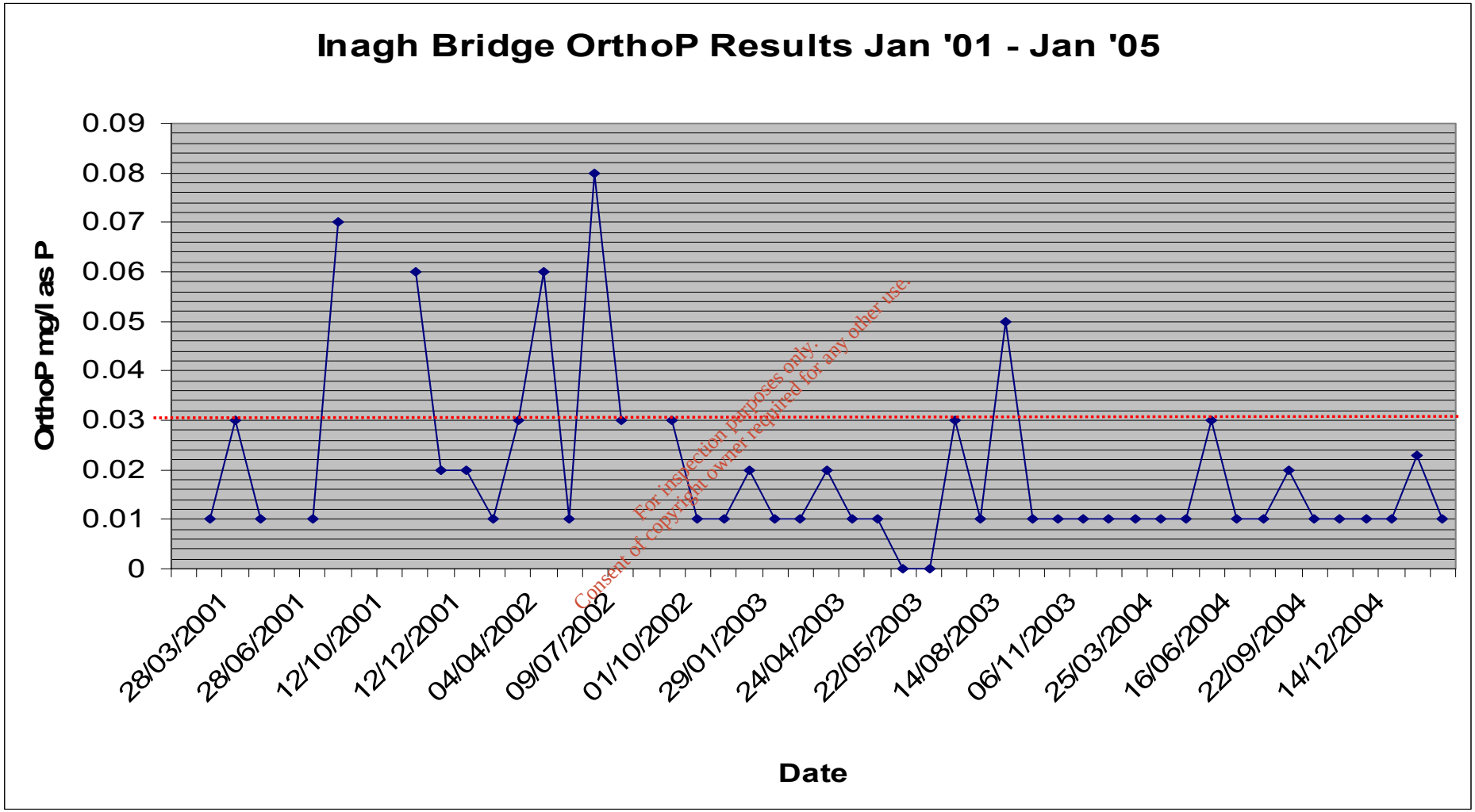


Figure 5.1 Orthophosphate Results From Inagh Bridge, January 2001 – January 2005

SECTION 6: RELEVANCE OF FINDINGS IN RELATION TO PROPOSED EQS FOR SURFACE WATERS IN IRELAND

In an EPA published document entitled "*Proposed Quality Standards For Surface Water Classification, A Discussion Document For Public Consultation, July 2007"* proposed Environmental Quality Standards (EQS) for Orthophosphate are set forth which are likely to come in to being in the not too distant future. The proposed EQS for Orthophosphate is set out in Table 6.1 below and Table 6.2 below shows the water quality status with the corresponding Q-rating.

TABLE 6.1 PROPOSED EQS FOR ORTHOPHOSPHATE IN RIVERS	
Parameter	**EQS**
Orthophosphate	TAV High/Good Boundary <16 µg P/l TAV Good/Moderate Boundary <30 µg P/l EQS High/Good Boundary <34 µg P/l EQS Good/Moderate Boundary <50 µg P/l (Median)

TABLE 6.2 Q RATINGS WITH CORRESPONDING WATER QUALITY STATUS	
Q Rating	**Water Quality Status**
Q5, Q4-5	High
Q4	Good
Q3-4	Moderate
Q3, Q2-3	Poor
Q2, Q1-2, Q1	Bad

According to the WFD an Environmental Quality Standard (EQS) is *"the concentration …(over a given time)… of a particular pollutant or group of pollutants in water, sediment or biota which should not be exceeded in order to protect human health and the environment."*

A Trigger Action Value (TAV) specifies a parallel, more stringent target for environmental quality for certain parameters. A Trigger Action Value (TAV) is a concept developed for establishing Irish standards and will be used to prevent deterioration of Irish waters by triggering management actions before status failures occur.

The TAVs represent the levels that 50% of the samples achieve and are consistent with the standards in the Irish Phosphorus Regulations. The proposed EQS is set at an

absolute status failure limit with any breach being reported to the European Commission and follow-up action required within the river basin management plan. Breach of the parallel (more stringent) TAV, in line with the existing Phosphorus Regulations, necessitates action at Member State level to investigate the cause of and take measures to prevent a failure of the EQS.

Given that the upstream site at Inagh Bridge has consistently rated as a Q4, this site would be classed as 'good' water quality. The EQS for High/Good boundary is given as 0.034mg/l as P, which is an increase from the Phosphorus Regulations figure of 0.03mg/l.

SECTION 7: DISCUSSION

The parameters analysed for downstream of the current wastewater discharge are currently within their respective limits as set out in the European Communities (Quality of Salmonid Waters) Regulations, 1988 (SI no.293 of 1988), and the EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, with the exception of Total Coliforms in the upstream and downstream locations which was in exceedence of the limit for A1 water under the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989.

Under the Local Government (Water Pollution) Act 1977 (Water Quality Standard For Phosphorus) Regulations, 1998 the recorded orthophosphate level both upstream and downstream of the discharge from the wastewater treatment plant is consistent with unpolluted waters.

Calculations based on the measured flow on the 11th July 2007 and on the average water quality over the four sampling events upstream of the current discharge, predict that if the treatment plant was upgraded to 2,000 P.E. with a treatment standard of 10mg/l BOD, 10mg/l SS, 9 mg/l Nitrates and 1 mg/l Orthophosphates there would be an increase in all parameters: BOD would increase from 2mg/l to 2.05mg/l which is below the EU Directive Guidance limit for Salmonid waters of <3mg/l. The levels of suspended solids and nitrates are predicted to increase slightly, yet remain well within their respective limits. Orthophosphate is predicted to increase from 0.01mg/l to 0.016mg/l which is within the limit of 0.03mg/l for unpolluted waters under the Local Government (Water Pollution) Act 1977 (Water Quality Standard For Phosphorus) Regulations, 1998

Calculations based on the calculated low flow and on the average water quality over the four sampling events upstream of the current discharge, predict that if the treatment plant was upgraded to 2,000 P.E. with a treatment standard of 10mg/l BOD, 10mg/l SS, 9 mg/l Nitrates and 1 mg/l Orthophosphates there would be an increase in all parameters as follows: BOD would increase from 2mg/l to 2.5mg/l which is below the EU Directive Guidance limit for Salmonid waters of <3mg/l. The concentrations of suspended solids would increase to 5.3mg/l which is well within the limit of 25mg/l for Salmonid waters; the nitrates would increase to 0.76mg/l which is well within the limit of 11.29mg/l. Orthophosphate is predicted to increase from 0.01mg/l to 0.07mg/l which is outside the limit of 0.03mg/l for unpolluted waters under the Local Government (Water Pollution) Act 1977 (Water Quality Standard For Phosphorus) Regulations, 1998 and translates as being moderately polluted waters.

Whilst the proposed upgrade would result in a higher quality effluent being discharged it represents an almost four fold increase in the volume of effluent being discharged. A summary calculation shows that to maintain the orthophosphate concentrations downstream of the discharge point within the proposed EQS of 0.034mg/l of orthophosphate as P, the plant would need to be upgraded to a higher specification of treatment and it would then allow for an increase in the population equivalent from 550P.E. to 720P.E.

Whilst the assimilative capacity calculations have been carried out on an assumption of 180 litres/person/day usage, there has been a recent EPA report suggesting that his figure may be excessive. In *"An Investigation into the Performance of Subsoils and Stratified Sand Filters for the Treatment of Wastewater from On-Site Systems," (EPA, 2005)*, the project showed that … *"domestic wastewater consumption was much lower than the 180 litres per capita per day (lcd) forecast and that a figure of 120 lcd would seem to be more reasonable for on-site treatment in Ireland."* On this basis, the volume as discharged would reduce from 360m^3/day to 240m^3/day. Or to keep the Inagh River within the proposed EQS of 0.034mg/l orthophosphate concentration, the P.E. would increase from 720 to 1,080. If a data logging flow meter was installed on the existing plant, and the number of persons using it accurately quantified, it would be possible to extrapolate what the average usage of domestic wastewater is on a daily basis.

The key issue with all assimilative capacities is the ability of the watercourse to assimilate orthophosphate, (the main limiting nutrient for freshwater systems), in low flow conditions. Under the Third Schedule of the Phosphorus Regulations, the orthophosphate concentrations that are given are

'....median concentrations using a minimum of ten samples taken at intervals of four weeks or longer in any twelve consecutive month period.'

With any assimilative capacity assessment that doesn't have 'live data' in accordance with the Third Schedule of the Phosphorus Regulations there is an assumption made on the baseline water quality that may not necessarily hold true, had the correct sampling regime been implemented. This could err in either direction i.e. it could show that the baseline water quality is better than thought or vice versa.

Attachment G1

Capital Investment Programme

Capital Investment Programme

Under Clare County Council's Water Services Investment Programme it is intended to upgrade the wastewater treatment plant and associated works to the pumping stations and network. The Preliminary Report was completed in March 2008 and is with the Department of Environment Heritage & Local Government. A Part VIII planning application was lodged with the Planning Section in Clare in 2008. Approval to proceed with the development was agreed in 2009, however a timescale for when the development will commence is uncertain. A copy of the current Water Services Investment Programme for 2007-2009 is attached.

Water Services Investment Programme 2007 –2009

Schemes at Construction	**W/S**	**Est. Cost.**
Ennis Town Water Supply Scheme Augmentation (H)	W	6,335,000
		6,335,000
Schemes to start 2007		
Ennis Town Water Supply Scheme (Treatment) (H)	W	6,819,000
Lisdoonvarna Water Supply Scheme Stage 2 (Ext. to Ballyvaughan)	W	5,768,000
Newmarket on Fergus Water Supply Scheme (excl. Advance Works)	W	5,624,000
		18,211,000
Schemes to start 2008		
Ballyvaughan*, Corofin* & Doolin Sewerage Scheme	S	18,025,000
Carrigaholt/Labasheeda Sewerage Scheme	S	12,000,000
Clare Sludge Management Plan (H)	S	5,624,000
Cooraclare Sewerage Scheme	S	1,570,000
Ennistymon, Liscannor, Miltown Malbay & Spanish Point Sewerage Scheme	S	12,875,000
Kilkee & Kilrush Sewerage Schemes	S	12,556,000
O'Callaghan's Mills, Bodyke, O'Brien's Bridge, Flagmount and Cratloe Sewerage Scheme	S	7,581,000
Quilty, Scarriff & Feakle* Sewerage Scheme	S	12,240,000
Shannon Town Sewerage Scheme (G)	S	9,775,000
West Clare Regional Water Supply Scheme (Contract 6)	W	9,200,000
		101,446,000
Schemes to start 2009		
Ennis Clarecastle Sewerage Scheme (H)	S	57,800,000
		57,800,000
Serviced Land Initiative		
Clarecastle Water Supply & Sewerage Scheme	W/S	5,134,000
Clonlara Sewerage Scheme	S	2,418,000
Inagh Sewerage Scheme	S	946,000
Tulla Water Supply & Sewerage Scheme	W/S	1,257,000
		9,755,000
Rural Towns & Villages Initiative		
Ballyvaughan Sewerage Scheme*	S	-
Broadford Sewerage Scheme	S	1,561,000
Corofin Sewerage Scheme*	S	-
Feakle Sewerage Scheme*	S	-
***Listed with Grouped Schemes above**		**1,561,000**
Schemes to Advance through Planning		
Castlelake Water Supply Scheme	W	21,000,000
Kilfenora Sewerage Scheme	S	840,000
Killaloe Sewerage Scheme	S	1,500,000
North Clare (Eastern Area) Water Supply Scheme	W	8,000,000
South East Clare Grouped Sewerage Scheme (Blackwater, Parkroe, Gillogue, Parteen, Athlunkard, Ardnacrusha, Larkyle, Ballycannon, Meelick, Montpelier)	S	7,601,000
		38,941,000
Water Conservation Allocation		**2,000,000**
Asset Management Study		**100,000**
Programme Total		**236,149,000**

(H) Refers to a Hub as designated in the National Spatial Strategy
(G) Refers to a Gateway as designated in the National Spatial Strategy

Attachment G3

Land Serviced Initiative Scheme Proposals for Inagh WWTP

1 EXECUTIVE SUMMARY

The existing Population Equivalent (PE) of Inagh is approximately 410. The design population projection for 2032 is estimated as 1,850 PE.

The existing network consists of:

- A combined and partially separate collection system, and
- A separate collection system consisting of:
  - A foul only collection system
  - A storm water only collection system

The combined and partially separate collection system is located in the local authority housing estates of River View and Callan View. Sewers are located within the gardens (front and rear) of properties and for this reason it is not feasible to attempt to separate this system. The limited extent of these combined sewers will have a minimal impact on the operation of the wastewater treatment plant and so are proposed to be left un-separated.

The foul only collection system has the hydraulic capacity to cater for future design flows and requires only minor modifications.

The storm water only collection system requires more significant modifications including upsizing of certain pipes.

The Wastewater Treatment Plant at Inagh is inadequate for the following reasons:

- Ineffective screening and removal of gross solids,
- No storm water balancing facility,
- Ineffective sludge handling and storage,
- No automated process control,
- Poor health and safety standards, and
- Insufficient treatment capacity for 10 and 25 year projected loads.

A phased programme of improvement and upgrading works for both the network and wastewater treatment plant is set out in this Report.

Assessment of the receiving waters indicates that the discharge standards should be:

	10 Year (2017)	25 Year (2032)
BOD	25 mg/l	15 mg/l
SS	35 mg/l	35 mg/l
Total N	15 mg/l	15 mg/l
Total P	3 mg/l	2 mg/l

Both the foul and storm water collection systems have been designed to upgrade and replace elements of the existing systems and include for current and future loadings up to the year 2032.

The foul sewerage network will discharge to the existing Waste Water Treatment Plant (WWTP) and will be designed to carry a hydraulic load of 6 DWF.

The storm water sewer network will discharge through hydrocarbon interceptors to the Inagh River at various outfall points along the river. It will be designed using best practice in line with Sustainable Drainage Systems (SUDS) principles.

The WWTP will initially be extended to cater for a PE of 1,200 and will allow for future expansion to accommodate an ultimate loading of 1,850 PE.

The various options for the scheme have been examined and it has been determined that the collection system should be procured as a traditional contract with the WWTP procured as a traditional contract if progressed as a stand-alone project or alternatively as a DB or DBO Contract.

It is proposed to phase the development of the wastewater treatment plant and the network and an outline programme for the development would be:

Phase 1A - Immediate Development (Completion by the end of 2009)

Wastewater Treatment Plant upgrade to 1,200 PE

Network development

Phase 1B – (Completion by early 2010)

Refurbishment of existing Wastewater Treatment Plant

Phase 2 - Development when necessary (likely to be 2017)

Wastewater Treatment Plant upgrade to 1,850 PE

It is recommended that WWTP elements, i.e. upgrading and refurbishment, of phases 1A and 1B are advanced as one Contract

The overall cost of each phase is given in **Table 1.1.**

Table 1.1: Scheme Costs (incl. VAT)

	Phase 1A (2008) €	Phase 1B (2008) €	Phase 2 (2017) €
Network			
Contract Costs	628,337		
Planning & Supervision	171,820		
Allowance for Inflation	40,008		
Total	**840,165**		
Wastewater Treatment Plant			
Contract Costs	1,384,700	153,225	425,625
Planning & Supervision	206,910	22,385	49,610
Allowance for Inflation	79,581	18,000	262,010
Total	**1,671,191**	**193,610**	**737,245**
Overall Phase Cost	**2,511,356**	**193,610**	**737,245**

**Costs include all planning, preliminaries, design, construction and associated costs.*

Thus the **projected overall cost of the scheme is projected to be €3,442,211 (including VAT)** covering the projected 25 year development window.

4.6 INAGH RIVER QUALITY

Sampling of the Inagh River upstream and downstream of the current WWTP discharge point was carried out in May, July and August 2007. **Table 4.5** shows the results of this monitoring. This limited assessment would indicate that the existing wastewater treatment plant discharge has little impact on the receiving waters.

Table 4.5: Upstream and Downstream Water Quality Testing at Inagh

Parameter	31/05/2007		11/07/2007		01/08/2007		14/08/2007	
	U/s	D/s	U/s	D/s	U/s	D/s	U/s	D/s
pH	7.9	7.9	8.3	8.1	7.6	7.5	7.4	7.4
BOD (mg/l)	<2	<2	2	2	2	2	<2	<2
Conductivity	190	193	168	172	189	187	169	170
Total Phosphorous (mg/l)	0.06	0.1	<0.05	<0.05	<0.05	<0.05	0.08	0.07
Suspended Solids (mg/l)	<5	<5	-	-	<5	7	<5	<5
Ammonia as N (mg/l)	0.05	0.3	<0.02	0.03	0.03	0.04	0.03	0.03
Total Nitrogen as N (mg/l)	<1	<1	1.03	1.04	1.01	1.00	<1	<1

Note: U/s = upstream, D/s = downstream.

4.7 WASTE ASSIMILATIVE CAPACITY

The waste assimilative capacity (WAC) of a river is based on the concept of treating the river as a resource which can accept pollution load assimilation without significant or permanent damage to the river as a resource (fish, drinking water etc.). By establishing quality objectives for the receiving water discharge standards based on the assimilation of pollutants such that the waters are not degraded below them.

The WAC of the Inagh River is based on the organic (BOD, Nitrogen and Phosphorus) load that can be assimilated by the 95 percentile flow before the water quality standards are exceeded.

$$WAC = (C_{MAX} - C_{BACK}) \times F_{95} \times 86.4 \text{ kg day}^{-1}$$

Where:

C_{MAX} = Maximum Permissible Concentration (mg/l)

C_{BACK} = The background (upstream) concentration (mg/l)

F_{95} = 95 percentile flow (cumecs)

86.4 = The factor to convert units to load per day

Ref: "*Water Technology: An Introduction for Environmental Scientists and Engineers*" (1999) by N.F.Gray

This capacity is readily converted into a discharge standard for a known plant hydraulic loading.

4.7.1 River Flow Data

The nearest downstream flow monitoring station on the Inagh River is located at Ennistymon (hydrometric station reference number 28001, approximately 14km downstream of the Inagh WWTP. The q_{95} and median (q_{median}) at this station are 0.21m^3/s and 2.45m^3/s respectively. These flows relate to a catchment area of 168km^2.

According to EPA data the catchment area at station 0200 at the bridge at Inagh is 65km^2. As station 0200 is only 325m upstream of the Inagh WWTP, the catchment area at the discharge point of the WWTP will be taken as 65km^2.

On a catchment area proportion basis, the q_{95} and q_{median} flows at the existing Inagh WWTP discharge point can be estimated as 0.08125m^3/s (81.25 l/s) and 0.9479m^3/s (947.9 l/s) respectively.

4.7.2 Phosphorus

The Urban Wastewater Regulations set a standard of 2mg/l P for a PE between 10,000 and 100,000 (there is no standard set for a PE < 10,000). As previously discussed in **Section 4.4**, the minimum standard to be achieved downstream of the plant outlet is Q4 and a target P concentration of 0.03mg/l (see **Table 4.3**). Background Orthophosphate levels (included in Appendix B) show an average reading of 0.02mg/l. WAC calculations for Phosphorus for both a 1,200PE and 1,850PE plant are calculated below.

$WAC = (C_{max} - C_{back}) \times F_{median}$ 86.4 kg/ day

C_{max} = 0.03 mg/l

C_{back} = 0.02 mg/l

F_{median} = estimated median flow in River = 0.9479m^3/s

WAC = 0.819kg/ day

For a 10 Year Window

Hydraulic Load = 1,200PE x 225 = 270 m^3/day

Allowable discharge Concentration = WAC/ hydraulic load = 0.819/ 270 = **3.0 mg/l**

For a 25 Year Window

Hydraulic Load = 1,850PE x 225 = 416.3 m^3/day

Allowable discharge Concentration = WAC/ hydraulic load = 0.819/ 416.3 = **2.0 mg/l**

The above calculation shows that the Inagh River would have adequate phosphorus load assimilative capacity for both 10 and 25 year design loadings and that phosphorus removal treatment is not necessary at the proposed Inagh WWTP.

4.7.3 BOD

The WAC for BOD required for discharge to the receiving waters is worked out below. The average background concentration in the river is <2mg/l. A maximum increase of 1mg/l is proposed. The estimated 95 percentile flow of 0.08125m^3/s is used in the calculation.

$$WAC = (C_{max} - C_{back}) \times (F_{95}) \times 86.4 \text{ kg/ day}$$

Where:

$(C_{max} - C_{back})$ = 1 mg/l

F_{95} = estimated 95 percentile flow in River = 0.08125m^3/s

WAC = 7.02 kg/ day

For a 10 Year Window

Hydraulic Load = 1,200PE x 225 = 270 m^3/day

Allowable discharge Concentration = WAC/ Hydraulic load = 7.02/ 270 = **26 mg/l**

For a 25 Year Window

Hydraulic Load = 1,850PE x 225 = 416.3 m^3/day

Allowable discharge Concentration = WAC/ Hydraulic load = 7.02/ 416.3 = **16.7 mg/l**

4.7.4 Suspended Solids

It is proposed to limit the increase in suspended solids to less than 5 mg/l.

$$WAC = (C_{max} - C_{back}) \times (F_{95}) \times 86.4 \text{ kg/ day}$$

Where :

$(C_{max} - C_{back})$ = 5 mg/l

F_{95} = estimated 95 percentile flow in River = 0.08125m^3/s

WAC = 35.1 kg/ day

For a 10 Year Window

Hydraulic Load = 1,200PE x 225 = 270 m^3/day

Allowable discharge Concentration = WAC/ BOD load = 35.1/ 180 = **195 mg/l**

For a 25 Year Window

Hydraulic Load = 1,850PE x 225 = 416.3 m^3/day

Allowable discharge Concentration = WAC/ BOD load = 35.1/ 416.3 = **84.3 mg/l**

The Urban Wastewater Directive has a maximum discharge standard of 35 mg/l for Suspended Solids and this standard will be applied.

4.7.5 Nitrogen

The standard of effluent from the WWTP will meet the Urban Wastewater Treatment Regulations (SI No 254 of 2001). This states that a minimum 70% Nitrogen removal will be required at the plant, this will equate to a discharge standard of 15 mg/l. A 70% removal would be readily achievable by any process required to reduce BOD to the limits stated above.

4.8 CONCLUSION

Assuming a two stage development of the Inagh WWTP, the effluent discharged from the plant to the receiving waters, at the design year loading, should be treated to the standards set out in **Table 4.6** to limit impacts on the receiving waters to ensure satisfactory water quality standards are maintained.

Table 4.6: Discharge Standards at the Inagh WWTP

Pollutant	WAC (kg/day)	Discharge Standard (mg/l)	
		10 Years 1,200 PE	25 Years 1,850PE
BOD_5	7.02	25	15
SS	35.1	35	35
Phosphorus	0.819	3.0	2.0
N	N/A	15	15

5.6 PROPOSED FOUL COLLECTION SYSTEM

The proposed works include the following:

- Future developer-led extension of the foul network from development lands referenced R2 to manhole reference FMh040 approximately 75m along the Ennis Road. Due to existing ground levels the foul flows from this development will need to be pumped via a rising main into the existing network at FMh040. It is recommended that construction of the rising main and the required pumping station within R2, is carried out when required, by the developer of the lands referenced R2.
- The foul sewers in Callan View suffer from encrustation and deformation. It is proposed that cleaning work be undertaken to remove the encrustation. Due to the location of the deformed sewers (front and rear private gardens), pipe material (uPVC) and the severity of the deformation (<20%) it has been suggested that it would not be cost effective to replace them. The affected sewers can be seen on **Figure 5.2**.

- Rehabilitation of a collapsed pipe to the rear of the houses in River View is required. The collapsed sewer is 18.5m in a downstream direction from manhole reference FMh085.

It is not proposed to separate any of the existing combined and partially separate sewers because of the location of these sewers. Many are located in front and rear gardens of the houses in the River View and Callan View housing estates.

Foul network improvement proposals can be seen in **Figure 5.6** at the end of this Chapter.

5.7 PUMPING STATION PROPOSALS

It is proposed to retain the existing pumping arrangement at the Milltown Road pumping station as currently there is provision for two hours at 3 DWF storage capacity. It is recommended that a pump failure alarm is installed to alert council staff should failure occur as there is a small element of surface water runoff contributing to the network upstream. Additional pumping may be required as part of any residential development on the Milltown Malbay Road (Ref: R1 on **Figure 5.6**). Consideration of such pumping is outside the scope of this Report but should be given detailed consideration when the relevant planning permission applications are under consideration.

In order to eliminate the overflow at the Church Yard pumping station, it is necessary to increase storage capacity and to install a permanent stand-by generator at the site. The existing pumping station does not have the capacity to hold the required wastewater volume. It is proposed to construct a new pumping station adjacent to the existing site with a storage capacity of $50m^3$ (equivalent to 2 hours storage at 3 DWF) as shown on **Figure 5.6**. It is also recommended that a pump failure alarm is installed to the new pumping station to notify council staff of any pump failures that may occur.

Additional pumping will be required as part of any proposed residential development on the Ennis and Ennistymon Roads (Ref's: R2 and R3 on **Figure 5.6**). Consideration of such pumping is outside the scope of this Report but should be given detailed consideration when the relevant planning permission applications are under consideration.

5.8 PROPOSED SURFACE WATER COLLECTION SYSTEM

5.8.1 Surface Water Management

The results of the impermeable area survey, which show the areas currently contributing surface water runoff to the system, are illustrated in **Figure 5.3** at the end of this Chapter.

The existing surface water drainage network in Inagh is comprised of 5 individual networks each with their own discrete catchments. Each catchment was analysed using the WinDAP modelling package. Details of each catchment are included in **Table 5.4**.

- No flooding occurs for a storm with a return period of 50 years,
- No surcharging occurs for a storm with a return period of 30 years,
- Attenuation of surface water to Greenfield runoff rates should be included in the design for all future development areas,
- Greenfield runoff rates can be set at 4 litres per second per hectare for Inagh. This has been determined using the Flood Studies Report method,
- Attenuation of a 50 year storm event is recommended, and
- Hydrocarbon interceptors should be provided on all outfalls.

5.9 EXTERNAL INFLUENCES

In examining the works required in order for the Inagh Sewerage Scheme network to cater for the 2032 design loading, a number of external influences need to be considered. These include:

Services (ESB, Eircom etc,)

There are a number of other services within the town. These services which include ESB, Eircom and watermains have been mapped and the mapping is included in **Appendix F**. Interaction with the relevant service providers will need to be considered during detailed design and construction.

Archaeology

A preliminary archaeological assessment will be required prior to preparation of contract documents and a construction watching brief will need to be implemented.

Site Investigation

Site Investigation works will be required to confirm ground conditions.

5.10 SUMMARY OF NETWORK RECOMMENDATIONS

Based on our analysis of the existing network and proposals for future phases our overall recommendations for the collection system are as follows:

- Construction of a new pumping station incorporating a permanent power generator, adjacent to the Church Yard PS. See **Figure 5.6**.

- Future developer led extension of the foul network (by the construction of a pumped rising main) from the proposed future development reference R2 the Ennis Road to manhole reference FMh040. See **Section 5.6** and **Figure 5.6**.
- The foul sewers in Callan View to be cleaned to remove identified encrustation. See **Section 5.6** and **Figure 5.6**.
- Rehabilitation of a collapsed pipe to the rear of the houses in River View. See **Section 5.6** and **Figure 5.6**.
- Permanent outfall structures to be constructed at all existing surface water network discharge points. See **Figure 5.1** for location details.
- Hydrocarbon interceptors to be installed at all existing surface water network discharge points. See **Figures 5.1** and **5.7** for location details.
- Upsizing of SWN04 from 450mm diameter to 600mm diameter to cater for future flows.
- Extension of SWN04 to service zoned land at R1. See **Figure 5.7**.
- Outstanding works to be completed by developer of Annaghdun development. See **Figure 5.7**.
- All future developments (residential, commercial, etc.) should have storm water management systems incorporating SUDS, including appropriate attenuation, silt and hydrocarbon treatment,
- All existing open drains/ditches should be maintained and/or culverted as development of land within each catchment occurs. All works to watercourses should include for the overall development of surface water collection within the entire catchment in addition to the needs for each development, and all discharge locations should have a permanent outfall structure.

6 WASTEWATER TREATMENT

6.1 EXISTING WASTEWATER TREATMENT PLANT

The existing treatment plant at Inagh was constructed in 1995/1996 for a population equivalent of 550 and to achieve discharge standards of 20mg/l of BOD_5 and 30mg/l of suspended solids. According to the scheme caretaker the WWTP is currently operating at capacity.

The plant receives mainly domestic wastewater as there is no industrial activity in the village. The flow enters the plant via a 225mm inlet sewer from the south east. Flow into the plant is by gravity but there are two pumping stations upstream of the plant as detailed in **Section 5.4**.

The lack of capacity for hydraulic flows (not capable of dealing with 6 DWF), the absence of storm water balancing, the deficit in clarifier capacity and washout of sludge are critical deficiencies in the existing plant which must be addressed.

6.4 PROPOSED WASTE WATER TREATMENT PLANT

6.4.1 Introduction

Arising out of the receiving waters assessment in Chapter 4 the treatment standards proposed are:

Table 6.5: Proposed Discharge Standards for Inagh WWTP

Parameter	Proposed Standard (mg/l)		EC Standard (91/271/EEC) (mg/l)
	10 Year	25 Year	
BOD^5	25	15	25
Suspended Solids	35	35	35
Total Nitrogen (N)	15	15	15
Total Phosphorous (P)	3	2	2

In order to attain these standards, additional treatment capacity will be required on site.

6.4.2 Secondary Treatment

There are many types of secondary treatment plants incorporating nutrient removal ranging from very high technology plants to relatively low technology plants, which would be suitable for this application. These are assessed taking into consideration County Council Policy and the contents of DEHLG Circulars L3/99 and L4/00.

The following biological treatment methods were considered: -

- Rotating Biological Contactor.
- Activated Sludge/Extended Aeration.
- Sequential Batch Reactor (SRB)
- Membrane Technology (i.e. submerged aerator filter)

If the DBO procedure is considered, this will allow the tenderer maximum flexibility in terms of treatment technology but in order to perform a preliminary design and cost estimate the Activated Sludge/Extended Aeration was considered to be the most practical option in comparison with the other options for the following reasons: -

- The existing WWTP is an Extended Aeration plant. The proposed treatment will effectively be an extension of the existing plant. Use of the same process will simplify the future operation and maintenance of the combined plant.
- Low capital costs.
- Small area of land required.
- The fall across the site need not be high.
- Can accommodate large variation in flow and organic loading.
- Low odour and no fly problems.
- Works well during all seasons of the year.
- Low noise using diffused air.
- Small quantities of sludge produced.

The proposed treatment method is an extended aeration treatment plant incorporating full carbonation, nitrification and denitrification. There will be no primary sedimentation thereby avoiding possible sources of odour. It is also proposed to include phosphorus reduction using chemical precipitation in order to reduce emissions to the Inagh River. The aeration system proposed is diffused air, which is more expensive to install but has lower running costs than surface aerators and allows for more precise control of the process. Diffused air also reduces noise and aerosols from the tanks to a minimum. Mixing of the tank contents will be separate from the aeration, so that each element can be economically designed to suit the process requirements and allow for more flexible process control.

Depending on the treatment technology chosen by the contractor it is proposed to treat all flows up to a minimum of 3 DWF and a maximum of 6 DWF with full secondary treatment. Wastewater flows in excess of 3 DWF and less than 6 DWF will be either be diverted to a storm-balancing tank or receive full secondary treatment. Flows in excess of 6 DWF will be discharged to the watercourse. The flow will be divided into two streams following screening and grit removal and each stream will be diverted to separate reactors and clarifiers before discharge to the outlet flume.

The effluent should be divided into at least two streams to allow for ease of maintenance and operation in the future. Two separate streams would accommodate the gradual development for the village and would mean that the construction could be divided into 2 phases with Phase 1 being 1 stream to cater for an additional PE of 650, increasing overall plant capacity to 1,200PE and Phase 2 being an additional stream to bring the capacity of the plant to 1,850 PE.

6.4.3 Typical Treatment Plant Elements

- Overflow Chamber with Screen
- Storm Tank
- Grit Chamber
- Screening (Mechanical)
- Reactors
- Clarifiers
- Sludge Return Sump
- Dewatering
- Plant Building/Control House (incl. SCADA, Panels etc)
- Flow Measurement & Sampling
- Siteworks (Pipework, MH, Ducting)

6.4.4 Process

Activated Sludge/Extended Aeration.

Extended aeration low loading rates (0.12 to 0.40) kg BOD/m^3.day.

6.4.5 Parameters (including the existing 550 PE plant capacity)

	10 Year	20 Year
F/M Ratio	= 0.1	= 0.1
BOD Loading	= 0.3 Kg BOD/m^3.d	= 0.3 Kg BOD/ m^3.d
MLSS	= 3,000 mg/l	= 3,000 mg/l
BOD Removal	= 90% - 95%	= 90% - 95%
Hydraulic Retention	= 30 - 36 Hours.	= 30 - 36 Hours.
PE[1]	= 1,200	= 1,850
DWF	= 270 m^3/day	= 416.3 m^3/day
3DWF	= 33.75 m^3/hr (9.4 l/s)	= 52 m^3/hr(14.5 l/s)
BOD Load	= 60 g/h/d = 72 Kg/d.	= 60 g/h/d = 111 Kg/d.

6.4.6 Screening

The screening of raw sewage dictates the quality of sludge and effluent produced. It is also one of the areas where odours may arise in a treatment plant. It may be necessary to house the inlet screens to facilitate the collection of any odours, which may arise and allow them to be scrubbed before discharge to the atmosphere. It is proposed to install an overflow screen similar to a discreen on the overflow. This consists of a series of vertical shafts, each fitted with overlapping discs, which rotate in the same direction at different speeds accelerating towards the downstream end. The screenings are continuously moved along the screen and kept in flow, while liquid passes through. The screen does not remove the screenings but retains them in the flow for removal in the treatment process. A 5 mm motorised raked bar screen will be installed on the foul flow stream going for treatment.

6.4.7 Grit Removal

The removal of grit is very important within the process. If the grit passes into large tanks associated with the plant, it will settle out, thereby reducing the volumes available and giving a medium for the growth of anaerobic bacteria. It will be possible in this plant to use diffused air in the grit trap, which allows greater control over the size of grit removed and, therefore, over the amount of organic deposited. The aerated grit trap serves a secondary function as means of air lifts that will discharge to a grit classifier housed within the screening house. Organics will be removed and returned to the flow. Grit will be deposited to skip, which will be located in the screening house to prevent odour escape. Between 0.004 m^3 and 0.2 m^3 of grit per 1,000 m^3 of flow can be expected.

6.4.8 Phosphorous Removal

There are two ways of reducing the phosphorus content of sewage, biological treatment and chemical precipitation. The former is very difficult to control and cannot reach the required standard without chemical precipitation. It would be more appropriate in larger plants. Chemical precipitation with an iron salt for the removal of phosphorus is by far the simplest method and, while running costs are somewhat higher than those for biological phosphorus removal, it is easier to control. Phosphorus removal is not required as the discharge standard will be 2 mg/l in the design year (2032).

6.4.9 Nitrification

Ammonia is a reduced form of nitrogen. It is normally present in domestic wastewater at a concentration of approximately 40 mg/l. It can be oxidised to form nitrate in a process called nitrification. The conversion of ammonia into nitrate occurs in two steps. The first step is the oxidation of ammonia to nitrate by a bacterium called Nitrosomonos and the second is the oxidation of nitrate to nitrate by a bacterium called Nitrobacter. These two organisms are very sensitive and grow very slowly.

Ammonia exerts a far greater oxygen demand per unit weight than most organic materials. On certain instances, the ammonia content of a domestic wastewater could contribute more than 25% of the total BOD. It is therefore important to prevent the material entering the receiving waters and to ensure that full nitrification occurs. In order to achieve this, the process has to be operated with a long sludge age (8 days or more) and with a sufficiently high oxygen input to cope with the additional oxygen demand. In order to ensure nitrification, the oxygen input should be at least 1kg/m^3/day, giving oxygen levels in excess of 2 mg/l in the reactors. With an adequate retention time, the same aerobic environment suitable for carbon oxidation is also suitable for nitrification.

6.4.10 Denitrification

Removal of nitrogen by biological means is simpler within an activated sludge system. Ammonia NH_3 in the sewage is progressively converted to nitrate NO_2 and nitrate NO_3 so that fully nitrified effluent is discharged at the outlet end of the system. By the time the sewage has been fully nitrified, all the carbonaceous material will have been oxidised. De-nitrification requires a carbon source for the chemical reactions necessary to release nitrogen to the atmosphere. This carbon source could be added to the effluent or the raw sewage can be used as the carbon source and mixed with the return sludge form the Clarifiers. This fully nitrified effluent in the form of nitrate would combine with the raw sewage in the anoxic (oxygen deficient) Zone and the bacteria within the zone would strip oxygen from the nitrate molecules to release free nitrogen, carbon dioxide and water.

It is proposed to allow de-nitrification to take place in the Reactors by switching off the diffused air for a period of time long enough to allow it occur.

Full de-nitrification should take place in about 30 minutes depending on temperature and MLSS. Carbon oxidation should also take place in less than an hour. Full nitrification will take approximately 4 hours depending on temperature and MLSS.

De-nitrification also has an economic benefit in that it allows for recovery of approximately 50% of the oxygen used in Nitrification in that the raw sewage strips the oxygen from the Nitrates for the carbonation process.

6.4.11 Aeration

Aeration of the reactors would be by means of fine bubble diffused air aeration so that any bank of diffusers may be removed from the surface without removing the tank from service. Control of the DO levels would be by means of sensors mounted just below the surface of the liquor. Because of the fact that the air is supplied to the sewage at the bottom of the tank, it is best to measure the DO near the surface when the air has been virtually fully absorbed.

These DO meters will maintain fixed levels of DO in each of the reactors by means of a SCADA system which will analyse the DO and adjust pneumatically operated valves feeding air into each tank. In this way, precise control of the process is maintained and running costs are minimised.

Following commissioning of the Phase 1 works, i.e. the introduction of the first 650 PE treatment capacity, refurbishment of the existing aeration system should be carried out. This should include replacement of the existing surface aerator with a fine bubble diffused aeration system as described above. The DO monitoring system should also be replaced. The location of the discharge point of the returned sludge from the sludge sump should be moved from its current location (near the overflow to the clarifiers) to a point nearer the inlet.

6.4.12 Sludge Return

It is proposed to provide for return sludge from each of the clarifiers with a provision for sludge draw off to the picket fence thickener in emergencies. The sludge will be returned to the reactors via the selector tank on order to allow de-nitrification to commence.

6.4.13 Secondary Clarifiers

A single standard circular tank is proposed for each stream. Sludge settled in the clarifiers would be scraped by means of a bridge mounted scraper which would deposit the settled sludge into a central conical sludge hopper from where the sludge could be drawn directly by means of a pipe manifold to the sludge return sump. This sludge return pump would pump the sludge to the Selector tank. Sludge will be returned on a continuous basis and there will be no wasting of excess sludge.

6.4.14 Outlet Works

It is recommended that the following equipment is installed at the outlet works:

(a) Flow Measurement.

(b) Flow Proportional Sampling.

6.4.15 Outfall

From the clarifiers, the treated liquid will flow to a collecting manhole and on through a flow measurement flume to the existing outfall to the Inagh River.

6.4.16 Sludge Treatment

MLSS will be removed continuously from the reactors to control the sludge age directly and to reduce the amount of sludge produced. It will be stored in a sludge storage tank for periods up to 21 days. The sludge produced at this plant will be dewatered on site and then transported off site to the county sludge hub in line with the Sludge Management Plan.

6.4.17 Plant Building/Control

It is proposed to extend the existing control building so as to facilitate the following elements of the treatment plant: -

- All control panels and SCADA/telemetry controls.
- Air blowers for the reactors, grit trap and pneumatic valving.
- Standby generator with an acoustic hood to reduce noise.
- Main control panel.
- Store workshop area to include for tractor, lawnmower, pressure cleaner and tools.
- Air extraction to collect air from the screening and grit removal and draw it through an odour scrubbing system.

Control of the WWTP will be by means of the SCADA system. The system will be capable of feeding information back to Clare County Council offices as required. It will ensure that the County Council have full information on the plant at all stages, including flows and influent/effluent monitoring. It is proposed that multiple stream continuous monitoring stations for COD, DO, pH, Phosphorus, and Nitrogen be installed on the inlet and outlet to the treatment plant with continuous feedback to the SCADA system. In addition, it is proposed that flow metering be installed on storm water and sludge return pipelines within the treatment plant to ensure the optimum amount of information is available on the performance of the plant.

6.4.18 Conclusion

It is recommended that the existing treatment plant be extended by constructing two phased parallel streams, each capable of treating a PE of 650 for an eventual total design capacity of 1,850 PE. If the levels of scheme growth, as discussed in **Sections 3.4** and **3.5**, are not realised it may not be necessary to extend the plant from the proposed first phase extension to 1,200 PE (i.e. current PE of 550 plus first phase extension of 650 PE).

The existing plant operation will be maintained throughout the construction period. Following commissioning of the Phase 1 works, the existing wastewater treatment plant will be refurbished.

Introduction of storm water balancing at the WWTP will prevent the possibility of wash-out following storm events, thereby reducing the risk of pollution by direct discharge of foul sewage to the Inagh River.

All of the works proposed will be sited at the existing WWTP (based on a total site area of 0.33 hectares as detailed in **Section 6.5** below.

6.5 OTHER INFLUENCES

Site Area: The existing site area is 0.2 hectares. Clare County Council is currently acquiring a further 0.13 hectares. The increased site size will facilitate the construction of a compact upgraded waste water treatment plant.

ESB: The plant appears to have an adequate power supply to cater for the upgrade works required with only minor upsizing of transformers and feed capacity. A standby generator will be necessary.

Other Services: There are no local services which would impede development of the site.

Archaeology: There were no archaeological finds during the previous development of the site and it is unlikely that any archaeological features will be uncovered during future developments of the site.

Ground Conditions: It is understood that no unusual ground conditions were discovered during the original construction of the plant. A site investigation will need to be carried out to verify the ground conditions and establish design parameters.

Sewage Treatment Plant

13.9m
69.2m
47m
15m
28.8m
80.3m

Inagh River

51.4

UND

52.9

River View

5 Ground

School

Callan View

CR

Inagh Bridge

53.8

54.8

Inagh

56.6

50.5

50.8

54.5

Church (Cath)

54.7

58.6

Area under construction

51.9

UND

NORTH

CLARE COUNTY COUNCIL
PLANNING SECTION
Received on 07 NOV 2008
File Ref. No. P08-8024

8024

CLARE COUNTY COUNCIL
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17 NOV 2008
PLANNING SECTION

61.7

CLARE COUNTY COUNCIL

New Road, Ennis, Co. Clare. Ph:- +353 65 6821616 Fax:- +353 65 68 21915
E-mail:- design@clarecoco.ie Web:- www.clare.ie
Tom Carey B.E., C.Eng., F.I.E.I. Director of Service & County Engineer

Project Title:	INAGH WASTEWATER TREATMENT PLANT UPGRADE PART VIII APPLICATION	Drawing Title:	SITE LOCATION MAP
		Scale:	N.T.S
Project Address:	INAGH, CO. CLARE	Drawing Ref:	08-01-02
		Revision No:	Revision Number A
Design By:	--	Drawn By:	JMG
Checked By:	--		
Project Ref:		Date:	29th OCTOBER 2008
Server Location.:-	P/CAPITAL SERVICED LAND INITIATIVE/PLANNING		

Sewage Treatment Plant

NORTH

P08 8024

13.9m

69.2m

NEW PALLISADE FENCING TO BE ERECTED 2.4METRES HIGH TO MATCH EXISTING

OUTFLOW MONITORING AND FLOW MEASUREMENT

RETAIN EXISTING SITE ENTRANCE

47m

15m

28.8m

80.3m

SLUDGE PUMPING CHAMBER

SLUDGE WASTE

SLUDGE SUMP

TO SLUDGE BELT PRESS

EXISTING SLUDGE SUMP

EXISTING SITE OFFICE

CLARIFICATION

AERATION

SLUDGE RETURN

EXISTING SLUDGE BELT PRESS HOUSING

EXISTING CLARIFICATION AND AERATION UNIT

EXISTING INLET WORKS TO BE DECOMMISSIONED FOLLOWING PHASE 1 CONSTRUCTION

INLET MANHOLE

STORMWATER BALANCING TANK

STORM

STORM TANK RETURN

PROPOSED INLET WORKS AND APPROPRIATE SCREENING, GRIT REMOVAL AND STORM OVERFLOW

EXISTING FENCE TO BE REMOVED

EXISTING FENCE TO BE REMAIN

Site Notice

Inagh

CLARE COUNTY COUNCIL RECEIVED - 7 NOV 2008 PLANNING SECTION

CLARE COUNTY COUNCIL Planning Section Received on 07 NOV 2008 File Ref. No. P 8-8024

CLARE COUNTY COUNCIL

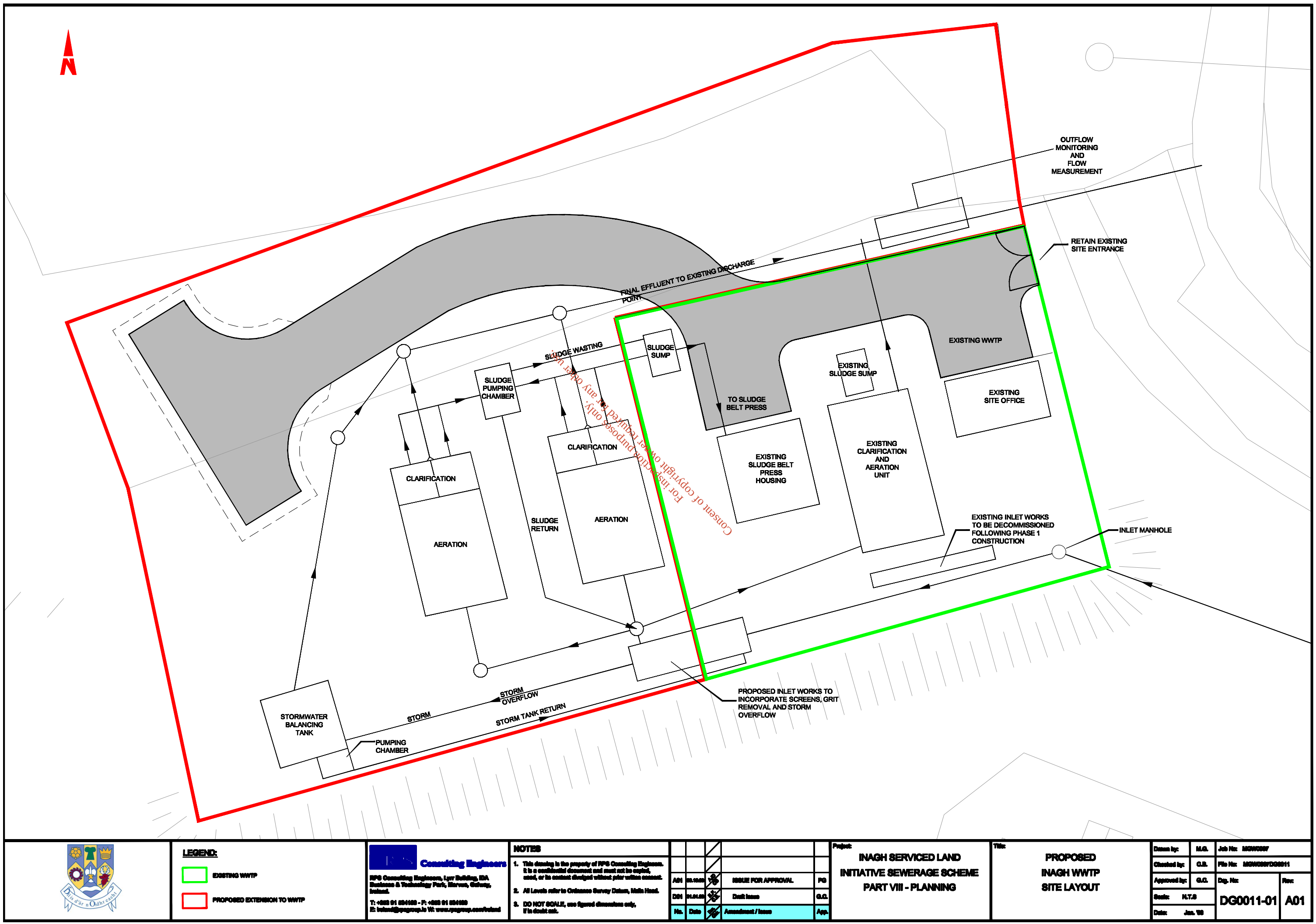
New Road, Ennis, Co. Clare. Ph:- +353 65 6821616 Fax:- +353 65 68 21915
E-mail:- design@clarecoco.ie Web:- www.clare.ie
Tom Carey B.E., C.Eng., F.I.E.I. Director of Service & County Engineer

Project Title:	INAGH WASTEWATER TREATMENT PLANT UPGRADE PART VIII APPLICATION	Drawing Title:	SITE LAYOUT PLAN
		Scale:	1:500
Project Address:	INAGH, CO. CLARE	Drawing Ref:	08-01-01
		Revision No:	Revision Number A
Design By:	--	Drawn By:	JMG
Checked By:	--		
Project Ref:		Date:	29TH OCTOBER 2008

Server Location.:- P/CAPITAL SERVICED LAND INITIATIVE/PLANNING

Attachment G3.1

Revised Site Layout for Inagh WWTP



LEGEND:

- EXISTING WWTP
- PROPOSED EXTENSION TO WWTP

RPS Consulting Engineers, Lyr Building, IDA Business & Technology Park, Merlwe, Galway, Ireland.
T: +353 91 534189 - F: +353 91 534189
E: ireland@rpsgroup.ie W: www.rpsgroup.com/ireland

NOTES

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No.	Date		Amendment / Issue	App.
A01	03.10.08		ISSUE FOR APPROVAL	PG
D01	01.08.08		Draft Issue	G.C.

Project: INAGH SERVICED LAND INITIATIVE SEWERAGE SCHEME PART VIII - PLANNING

Title: PROPOSED INAGH WWTP SITE LAYOUT

Drawn by:	M.G.	Job No:	MGW0007
Checked by:	C.B.	File No:	MGW0007DG0011
Approved by:	G.C.	Dwg. No:	DG0011-01
Scale:	N.T.S	Rev:	A01
Date:	Jan. '09		

ANNEX 1: TABLES/ATTACHMENTS

Standard forms are provided in this section for the recording and presentation of environmental monitoring results.

TABLE D.1(i)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Primary Discharge Point)

Discharge Point Code: P (SW1)

Source of Emission:	Inagh Wastewater Treatment Plant
Location:	Carrowkeel West, Inagh, Co. Clare
Grid Ref. (12 digit, 6E, 6N):	E120649 ; N181503
Name of receiving waters:	River Inagh
River Basin District:	Shannon International River District Basin
Designation of receiving waters:	None
Flow rate in receiving waters:	0.06 $m^3.sec^{-1}$ Dry Weather Flow 0.08 $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted:			
Normal/day	140 m^3	Maximum/day	m^3
Maximum rate/hour	m^3	Period of emission (avg)	60 min/hr 24 hr/day 365 day/yr
Dry Weather Flow	m^3/sec		

TABLE D.1(i)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of the emission (Primary Discharge Point)

Discharge Point Code: P (SW1)

Number	Substance	As discharged	
		Max. daily average	
1	pH	7.4	
2	Temperature		
3	Electrical Conductivity(@25°C)	454	
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids	4	
5	Ammonia (as N)	8.69	
6	Biochemical Oxygen Demand	<2	
7	Chemical Oxygen Demand	32	
8	Total Nitrogen (as N)	4.78	
9	Nitrite (as N)	0.561	
10	Nitrate (as N)	0.86	
11	Total Phosphorus (as P)	0.315	
12	Orthophosphate (as P)[Note 1]	0.264	
13	Sulphate (SO_4)	31.02	
14	Phenols (sum) [Note 2] (ug/l)	<0.10	

Note 1: For waste water samples this monitoring should be undertaken on a sample filtered on 0.45μm filter paper.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE D.1(i)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS

Primary Discharge Point - Characteristics of the emission
Discharge Point Code: ***P(SW1)***

Number	Substance	As discharged		
		Max. daily average (µg/l)	kg/day	kg/year
1	Atrazine	<0.01		
2	Dichloromethane	<1		
3	Simazine	<0.01		
4	Toluene	<0.28		
5	Tributyltin	<0.02		
6	Xylenes	<1		
7	Arsenic	<0.96		
8	Chromium	<0.93		
9	Copper	5		
10	Cyanide	<5		
11	Fluoride	140		
12	Lead	<0.38		
13	Nickel	<0.47		
14	Zinc	9.2		
15	Boron	<4.2		
16	Cadmium	<0.09		
17	Mercury	<0.2		
18	Selenium	1		
19	Barium	4.3		

TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING
(Primary Discharge Point – one table per upstream and downstream location)

Discharge Point Code: ***P (SW1)***

MONITORING POINT CODE: ***aSW1u***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
PH	7.4				Grab	0.01	Electrometry
Temperature							
Electrical Conductivity (@25°C)	126				Grab	0.5	Spectrometry
Suspended Solids	<3				Grab	3	Drying @104 C
Ammonia (as N)	0.06				Grab	0.09	Colorimetry
Biochemical Oxygen Demand	<2				Grab	2	Electrometry
Chemical Oxygen Demand	34				Grab	5	Colorimetry
Dissolved Oxygen					Grab		
Hardness (as $CaCo_3$)	27				Grab	10	Colorimetry
Total Nitrogen (as N)	<1.00				Grab	1	Calculation
Nitrite (as N)	0.004				Grab	0.003	Colorimetry
Nitrate (as N)	0.12				Grab	0.09	Colorimetry
Total Phosphorus (as P)	0.059				Grab	0.005	Colorimetry/Digestion
Orthophosphate (as P) - unfiltered	<0.005				Grab	0.006	Colorimetry
Sulphate (SO_4)	<0.28				Grab	2.11	Colorimetry
Phenols (sum) [Note 2] (ug/l)	<0.10				Grab	0.1	GC-MS2

Note 1: Or other unit as appropriate – please specify.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)
(Primary Discharge Point - one table per upstream and downstream location)

Discharge Point Code: ***P (SW1)***

MONITORING POINT CODE: ***aSW1u***

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
Atrazine	<0.01				Grab	0.01	HPLC
Dichloromethane	<1				Grab	1	GC-MS 1
Simazine	<0.01				Grab	0.01	HPLC
Toluene	<0.28				Grab	1	GC-MS 1
Tributyltin	<0.02				Grab	0.02	GCMS
Xylenes	<1				Grab	1	GC-MS 1
Arsenic	<0.96				Grab	0.96	ICPMS
Chromium	<0.93				Grab	0.93	ICPMS
Copper	6				Grab	0.2	ICPMS
Cyanide	<5				Grab	5	Colorimetry
Fluoride	170				Grab	0.09	Colorimetry
Lead	0.9				Grab	0.38	ICPMS
Nickel	<0.47				Grab	0.47	ICPMS
Zinc	6.7				Grab	4.6	ICPMS
Boron	<4.2				Grab	4.2	ICPMS
Cadmium	<0.09				Grab	0.09	ICPMS
Mercury	<0.2				Grab	0.2	ICPMS
Selenium	1				Grab	0.74	ICPMS
Barium	<0.74				Grab	0.74	ICPMS

TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING
(Primary Discharge Point – one table per upstream and downstream location)

Discharge Point Code: ***P (SW1)***

MONITORING POINT CODE: ***aSW1d***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
pH	7.3				Grab	0.01	Electrometry
Temperature							
Electrical Conductivity (@25°C)	129				Grab	0.5	Spectrometry
Suspended Solids	20				Grab	3	Drying @104 C
Ammonia (as N)	0.08				Grab	0.09	Colorimetry
Biochemical Oxygen Demand	<2				Grab	2	Electrometry
Chemical Oxygen Demand	36				Grab	5	Colorimetry
Dissolved Oxygen					Grab		
Hardness (as $CaCo_3$)	28				Grab	10	Colorimetry
Total Nitrogen (as N)	<1.00				Grab	1	Calculation
Nitrite (as N)	0.003				Grab	0.003	Colorimetry
Nitrate (as N)	0.19				Grab	0.09	Colorimetry
Total Phosphorus (as P)	0.087				Grab	0.005	Colorimetry/Digestion
Orthophosphate (as P) - unfiltered	<0.005				Grab	0.006	Colorimetry
Sulphate (SO_4)	<1.39				Grab	2.11	Colorimetry
Phenols (sum) [Note 2] (ug/l)	<0.10				Grab	0.1	GC-MS2

Note 1: Or other unit as appropriate – please specify.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)
(Primary Discharge Point - one table per upstream and downstream location)

Discharge Point Code: ***P (SW1)***

MONITORING POINT CODE: ***aSW1d***

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
Atrazine	<0.01				Grab	0.01	HPLC
Dichloromethane	<1				Grab	1	GC-MS 1
Simazine	<0.01				Grab	0.01	HPLC
Toluene	37.206				Grab	1	GC-MS 1
Tributyltin	<0.02				Grab	0.02	GCMS
Xylenes	10.195				Grab	1	GC-MS 1
Arsenic	<0.96				Grab	0.96	ICPMS
Chromium	2.3				Grab	0.93	ICPMS
Copper	3				Grab	0.2	ICPMS
Cyanide	<5				Grab	5	Colorimetry
Fluoride	160				Grab	0.09	Colorimetry
Lead	<0.38				Grab	0.38	ICPMS
Nickel	3.7				Grab	0.47	ICPMS
Zinc	20.9				Grab	4.6	ICPMS
Boron	121.3				Grab	4.2	ICPMS
Cadmium	<0.09				Grab	0.09	ICPMS
Mercury	<0.2				Grab	0.2	ICPMS
Selenium	1				Grab	0.74	ICPMS
Barium	2.1				Grab	0.74	ICPMS

TABLE D.1(ii)(a): EMISSIONS TO SURFACE/GROUND WATERS
(Secondary Discharge Point) (1 table per discharge point)

Discharge Point Code: SW2

Source of Emission:	Church Yard Pumping station
Location:	Church Yard, Inagh, Co. Clare
Grid Ref. (12 digit, 6E, 6N):	E120834; N181287;
Name of receiving waters:	River Inagh
River Basin District:	Shannon International River District Basin
Designation of receiving waters:	None
Flow rate in receiving waters:	0.06 $m^3.sec^{-1}$ Dry Weather Flow 0.08 $m^3.sec^{-1}$ 95%ile flow

Emission Details:

(i) Volume emitted: Not Recorded –Storm overflow, emissions occurs in emergency situations only. No flow at time of sampling.

Normal/day	m^3	Maximum/day	m^3
Maximum rate/hour	m^3	Period of emission (avg)	_____min/hr _____hr/day _____day/yr
Dry Weather Flow	m^3/sec		

TABLE D.1(ii)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of the emission (1 table per discharge point)
(Secondary Discharge Point)

Discharge Point Code: ***SW2***

Number	Substance	As discharged	
		Max. daily average	
1	pH		
2	Temperature		
3	Electrical Conductivity (@25°C)		
		Max. daily average (mg/l)	**kg/day**
4	Suspended Solids		
5	Ammonia (as N)		
6	Biochemical Oxygen Demand		
7	Chemical Oxygen Demand		
8	Total Nitrogen (as N)		
9	Nitrite (as N)		
10	Nitrate (as N)		
11	Total Phosphorus (as P) Note 1		
12	Orthophosphate (as P)		
13	Sulphate (SO_4)		
14	Phenols (sum) Note 2 (ug/l)		

Note 1: For waste water samples this monitoring should be undertaken on a sample filtered on 0.45μm filter paper.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE D.1(ii)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS

Secondary Discharge Point - Characteristics of the emission (1 table per discharge point)

Discharge Point Code:_____SW2_____

Number	Substance	As discharged		
		Max. daily average (µg/l)	kg/day	kg/year
1	Atrazine			
2	Dichloromethane			
3	Simazine			
4	Toluene			
5	Tributyltin			
6	Xylenes			
7	Arsenic			
8	Chromium			
9	Copper			
10	Cyanide			
11	Fluoride			
12	Lead			
13	Nickel			
14	Zinc			
15	Boron			
16	Cadmium			
17	Mercury			
18	Selenium			
19	Barium			

TABLE F.1(ii)(a): SURFACE/GROUND WATER MONITORING - (1 table per discharge point upstream and downstream locations) (Secondary Discharge Point)

Discharge Point Code: ***SW2***

MONITORING POINT CODE: ***aSW2u***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
pH	7.2				Grab	0.01	Electrometry
Temperature							
Electrical Conductivity (@25°C)	126				Grab	0.5	Spectrometry
Suspended Solids	3				Grab	3	Drying @104 C
Ammonia (as N)	0.04				Grab	0.09	Colorimetry
Biochemical Oxygen Demand	<2				Grab	2	Electrometry
Chemical Oxygen Demand	29				Grab	5	Colorimetry
Dissolved Oxygen					Grab		
Hardness (as $CaCo_3$)	33				Grab	10	Colorimetry
Total Nitrogen (as N)	<1.00				Grab	1	Calculation
Nitrite (as N)	<0.003				Grab	0.003	Colorimetry
Nitrate (as N)	0.12				Grab	0.09	Colorimetry
Total Phosphorus (as P)	0.039				Grab	0.005	Colorimetry/Digestion
Orthophosphate (as P) - unfiltered	<0.005				Grab	0.006	Colorimetry
Sulphate (SO_4)	<1.39				Grab	2.11	Colorimetry
Phenols (sum) [Note 2] (ug/l)	<0.10				Grab	0.1	GC-MS2

Note 1: Or other unit as appropriate – please specify.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE F.1(ii)(b): SURFACE/GROUND WATER MONITORING - (1 table per discharge point upstream and downstream locations) (Secondary Discharge Point)

Discharge Point Code: ***SW2***

MONITORING POINT CODE: ***aSW2u***

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
Atrazine	<0.01				Grab	0.01	HPLC
Dichloromethane	<1				Grab	1	GC-MS 1
Simazine	<0.01				Grab	0.01	HPLC
Toluene	<0.28				Grab	1	GC-MS 1
Tributyltin	<0.02				Grab	0.02	GCMS
Xylenes	<1				Grab	1	GC-MS 1
Arsenic	<0.96				Grab	0.96	ICPMS
Chromium	5.1				Grab	0.93	ICPMS
Copper	3				Grab	0.2	ICPMS
Cyanide	<5				Grab	5	Colorimetry
Fluoride	170				Grab	0.09	Colorimetry
Lead	1.3				Grab	0.38	ICPMS
Nickel	4.2				Grab	0.47	ICPMS
Zinc	47.9				Grab	4.6	ICPMS
Boron	146.7				Grab	4.2	ICPMS
Cadmium	<0.09				Grab	0.09	ICPMS
Mercury	<0.2				Grab	0.2	ICPMS
Selenium	1				Grab	0.74	ICPMS
Barium	9.0				Grab	0.74	ICPMS

TABLE F.1(ii)(a): SURFACE/GROUND WATER MONITORING - (1 table per discharge point upstream and downstream locations)
(Secondary Discharge Point)

Discharge Point Code: ***SW2***

MONITORING POINT CODE: ***aSW2d***

Parameter	Results (mg/l[Note 1])				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
pH	7.3				Grab	0.01	Electrometry
Temperature							
Electrical Conductivity (@25°C)	128				Grab	0.5	Spectrometry
Suspended Solids	<3				Grab	3	Drying @104 C
Ammonia (as N)	0.05				Grab	0.09	Colorimetry
Biochemical Oxygen Demand	<2				Grab	2	Electrometry
Chemical Oxygen Demand	31				Grab	5	Colorimetry
Dissolved Oxygen					Grab		
Hardness (as $CaCo_3$)	29				Grab	10	Colorimetry
Total Nitrogen (as N)	<1.00				Grab	1	Calculation
Nitrite (as N)	<0.004				Grab	0.003	Colorimetry
Nitrate (as N)	0.10				Grab	0.09	Colorimetry
Total Phosphorus (as P)	0.057				Grab	0.005	Colorimetry/Digestion
Orthophosphate (as P) - unfiltered	<0.005				Grab	0.006	Colorimetry
Sulphate (SO_4)	<1.39				Grab	2.11	Colorimetry
Phenols (sum) [Note 2] (ug/l)	<0.10				Grab	0.1	GC-MS2

Note 1: Or other unit as appropriate – please specify.
Note 2: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE F.1(ii)(b): SURFACE/GROUND WATER MONITORING - (1 table per discharge point upstream and downstream locations) (Secondary Discharge Point)

Discharge Point Code: ***SW2***

MONITORING POINT CODE: ***aSW2d***

Parameter	Results (µg/l)				Sampling method (grab, drift etc.)	Limit of Quantitation	Analysis method / technique
	14/04/09	Date	Date	Date			
Atrazine	<0.01				Grab	0.01	HPLC
Dichloromethane	<1				Grab	1	GC-MS 1
Simazine	<0.01				Grab	0.01	HPLC
Toluene	<0.28				Grab	1	GC-MS 1
Tributyltin	<0.02				Grab	0.02	GCMS
Xylenes	<1				Grab	1	GC-MS 1
Arsenic	<0.96				Grab	0.96	ICPMS
Chromium	<0.93				Grab	0.93	ICPMS
Copper	2				Grab	0.2	ICPMS
Cyanide	<5				Grab	5	Colorimetry
Fluoride	180				Grab	0.09	Colorimetry
Lead	<0.38				Grab	0.38	ICPMS
Nickel	1.7				Grab	0.47	ICPMS
Zinc	<4.6				Grab	4.6	ICPMS
Boron	<4.2				Grab	4.2	ICPMS
Cadmium	<0.09				Grab	0.09	ICPMS
Mercury	<0.2				Grab	0.2	ICPMS
Selenium	1				Grab	0.74	ICPMS
Barium	<0.74				Grab	0.74	ICPMS

TABLE E.1(i): WASTE WATER FREQUENY AND QUANTITY OF DISCHARGE – Primary and Secondary Discharge Points

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)
P (SW1)	365	51100

TABLE E.1(ii): WASTE WATER FREQUENY AND QUANTITY OF DISCHARGE – Storm Water Overflows

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)	Complies with Definition of Storm Water Overflow
SW2	Discharge in emergency situation only	Not Recorded	Y

ANNEX 2: Check List For Regulation 16 Compliance

Regulation 16 of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007) sets out the information which must, in all cases, accompany a discharge licence application. In order to ensure that the application fully complies with the legal requirements of Regulation 16 of the 2007 Regulations, all applicants should complete the following.

In each case, refer to the attachment number(s) of your application which contain(s) the information requested in the appropriate sub-article.

Regulation 16(1) In the case of an application for a waste water discharge licence, the application shall -		Attachment Number	Checked by Applicant ✓
(a)	give the name, address, telefax number (if any) and telephone number of the applicant (and, if different, of the operator of any treatment plant concerned) and the address to which correspondence relating to the application should be sent and, if the operator is a body corporate, the address of its registered office or principal office,	**Application Form**	✓
(b)	give the name of the water services authority in whose functional area the relevant waste water discharge takes place or is to take place, if different from that of the applicant,	**Application Form**	✓
(c)	give the location or postal address (including where appropriate, the name of the townland or townlands) and the National Grid reference of the location of the waste water treatment plant and/or the waste water discharge point or points to which the application relates,	**Application Form**	✓
(d)	state the population equivalent of the agglomeration to which the application relates,	**B9 (i)**	✓
(e)	specify the content and extent of the waste water discharge, the level of treatment provided, if any, and the flow and type of discharge,	**C1 C2 C1.1 C1.2**	✓
(f)	give details of the receiving water body, including its protected area status, if any, and details of any sensitive areas or protected areas or both in the vicinity of the discharge point or points likely to be affected by the discharge concerned, and for discharges to ground provide details of groundwater protection schemes in place for the receiving water body and all associated hydrogeological and geological assessments related to the receiving water environment in the vicinity of the discharge.	**F1 F1.1**	✓

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Regulation 16(1) continued…/		Attachment Number	Checked by Applicant ✓
(g)	identify monitoring and sampling points and indicate proposed arrangements for the monitoring of discharges and, if Regulation 17 does not apply, provide details of the likely environmental consequences of any such discharges,	**B1 D2 E3**	✓
(h)	in the case of an existing waste water treatment plant, specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application,	**E4**	✓
(i)	describe the existing or proposed measures, including emergency procedures, to prevent unintended waste water discharges and to minimise the impact on the environment of any such discharges,	**C1.1 C1.2 G1 G3**	✓
(j)	give particulars of the nearest downstream drinking water abstraction point or points to the discharge point or points,	**Not Applicable**	✓
(k)	give details, and an assessment of the effects, of any existing or proposed emissions on the environment, including any environmental medium other than those into which the emissions are, or are to be made, and of proposed measures to prevent or eliminate or, where that is not practicable, to limit any pollution caused in such discharges,	**F1 F1.1**	✓
(l)	give detail of compliance with relevant monitoring requirements and treatment standards contained in any applicable Council Directives of Regulations,	**F1**	✓
(m)	give details of any work necessary to meet relevant effluent discharge standards and a timeframe and schedule for such work.	**B10 G1**	✓
(n)	Any other information as may be stipulated by the Agency.		

Regulation 16(3) Without prejudice to Regulation 16 (1) and (2), an application for a licence shall be accompanied by -		**Attachment Number**	**Checked by the applicant ✓**
(a)	a copy of the notice of intention to make an application given pursuant to Regulation 9,	**B8**	✓
(b)	where appropriate, a copy of the notice given to a relevant water services authority under Regulation 13,	**Not Applicable**	✓
(c)	Such other particulars, drawings, maps, reports and supporting documentation as are necessary to identify and describe, as appropriate -	**B1**	✓
	(i) the point or points, including storm water overflows, from which a discharge or discharges take place or are to take place, and	**B1**	✓
	(ii) the point or points at which monitoring and sampling are undertaken or are to be undertaken,	**B1**	✓
(d)	such fee as is appropriate having regard to the provisions of Regulations 38 and 39.	**B9(iii)**	✓
Regulation 16(4) An original application shall be accompanied by 2 copies of it and of all accompanying documents and particulars as required under Regulation 16(3) in hardcopy or in an electronic or other format as specified by the Agency.		**Application Form**	✓
Regulation 16(5) For the purpose of paragraph (4), all or part of the 2 copies of the said application and associated documents and particulars may, with the agreement of the Agency.			✓
	Signed original.	Attached	✓
	2 hardcopies of application provided or 2 CD versions of application (PDF files) provided.	Attached	✓
	1 CD of geo-referenced digital files provided.	Attached	✓
Regulation 17 Where a treatment plant associated with the relevant waste water works is or has been subject to the European Communities (Environmental Impact Assessment) Regulations 1989 to 2001, in addition to compliance with the requirements of Regulation 16, an application in respect of the relevant discharge shall be accompanied by a copy of an environmental impact statement and approval in accordance with the Act of 2000 in respect of the said development and may be submitted in an electronic or other format specified by the Agency		**Not Applicable**	✓
	EIA provided if applicable	**Not Applicable**	✓
	2 hardcopies of EIS provided if applicable.	**Not Applicable**	✓

	2 CD versions of EIS, as PDF files, provided.	**Not Applicable**	✓