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Office of Environmental Enforcement,
Environmental Protection Agency,
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4th September 2009

Dear Sirs,

"Urban Waste Water Discharges in Ireland for Population Equivalents Greater than 500 Persons. A Report for the Years 2006-2007". Ref. Midleton UWWDL (D0056-01) - a submission and request that the Agency perform its functions under the European Communities (Environmental Liability) Regulations 2008 (S.I. No. 547 of 2008).

I write in relation to the Urban Waste Water Discharge from Midleton, Co. Cork (Waste Water Discharge Licence ref. no. D0056-01) and to Dr. Karen Creed's letter of 17th June advising me that the Marine Institute has now been invited to make a submission about the discharge from Midleton into the marine environment in Cork Harbour, as with other similar discharges to the sea, and enclosing the letter to them of the same date. Dr. Creed's letter states that the EPA also intends to notify and invite submissions from other bodies, which could also be expected to take an interest in the potential pollution of coastal waters that might affect shellfish beds, namely:

The Sea Fisheries Protection Authority
Food Safety Authority of Ireland
Bord Iascaigh Mhara
South Western Regional Fisheries Board

I thought I should copy this letter to all these bodies; to the Irish Shellfish Association; to the Southern Health Board and also the Legal Unit in Brussels to alert them and maybe yourselves, that all is not at all as they might read in your "Report on the Urban Waste Water Discharges in Ireland for the years 2006-2007" and, more than that, there is a real danger to human health if they allow themselves to believe in the endorsement your Report appears to give to the Midleton discharges.

I also write to ask you to perform your functions under the European Communities (Environmental Liability) Regulations 2008 (S.I. No. 547 of 2008). Clearly the only case, that I have detailed

information about, concerns the discharges from Midleton, but, I presume, the same sort of situation may well apply elsewhere and thus be of added interest to your consultees.

Although you report that 85% of WWTP's under the control of Cork County Council do not achieve the effluent standards required under the UWWTD, I am disturbed that the effluent from Midleton WWTP appears to get a completely clean bill of health. I am not privy to which 12 days' effluent results were provided to you each year, but the average monthly effluent results, recorded in the EPS Monthly Reports are certainly worth thinking about:

Average monthly BOD results (consent level: 20mg/l)

2006 2.3, 2.5, 2.0, 2.0, 2.5, 3.0, 3.5, 3.4, 4.0, 3.5, 2.8, 3.5
2007 5.5, 4.2, 3.0, 4.0, 2.6, 2.5, 4.0, 3.2, 3.0, 3.2, 3.0, 4.0

Average monthly COD results (consent level: 125mg/l)

2006 18.4, 19.8, 19.0, 19.0, 25.1, 36.9, 26.0, 23.0, 20.7, 17.6, 23.2, 20.2
2007 18.1, 17.7, 20.0, 20.0, 20.9, 24.0, 24.0, 19.0, 17.0, 18.0, 15.0, 17.7

Average monthly TSS results (consent level: 30mg/l)

2006 2.2, 3.2, 3.0, 4.0, 4.8, 12.0, 6.7, 5.0, 10.8, 18.0, 11.9, 6.9
2007 7.0, 11.2, 10.0, 8.0, 9.7, 11.4, 11.3, 10.6, 9.9, 8.9, 6.8, 6.2

I have made a table of these monthly average compliance parameters, with a section noting the number of individual failures each month. From the start of records supplied to me in January 2002 until the end of 2008, there were only 40 failures in 4,761 effluent samples – a failure rate of 0.84%. I enclose this table **(1)**.

At first sight it may appear to you – and almost certainly to the lay reader - that Midleton WWTP is producing superlative results, about **5-10 times better** than is needed to comply with the consent levels above. However, after a moment of reflection on the costs of the treatment process (the ESB bill for the plant is about €250,000 p.a.) and the fact that the Plant Operator is **not** paid for achieving anything greater than the 20:30 standard, do you think such results can, in the real world, be remotely credible?

I have also included 3 columns on the left of the table showing how often each month the influent BOD load exceeded the load for which the plant was designed. You will see that very often each month, the influent load was greater than the 20% danger level which M.C.O'Sullivan, who designed the plant, warned of – see **(8)**. But the loads do not stop at 20% in excess and I include the numbers of times that the loads were twice and even over three times the design load. These are so far over the top, that that the chance of effluent being produced, which can meet, let alone be 5-10 times lower than the consent level required, is just way beyond the bounds of possibility – and yet, knowing all about this frequent and massive over-loading of the plant, as you do – your Report still, quite clearly, leaves us with the impression that the Midleton plant is performing superbly.

It would seem to us that the effect of the Midleton WWTP discharge to the receiving waters is not, therefore, adequately described by the effluent results alone **if** that effluent makes up only a small part of the total discharge to the environment and I propose to outline again for you those **other untreated discharges** which emanate from the WWTP and sewerage system. I also hope that this may disturb your consultee bodies sufficiently that they may ask you to revisit your apparent endorsement of this particular town's discharges, which would seem to have been responsible for over 1,000 people having been made ill; for the only actual closure of a Grade B oyster fishery yet in Ireland and to totally misrepresent the true position.

Consider the effluent results on which you based your Report and our many submissions to you over the years that Midleton WWTP could never cope with even the design load, let alone the increasingly large loads imposed on it by the very rapid expansion of the town since the WWTP was designed in 1993 and constructed (to that design) in 2000.

My consulting engineer and scientist has sent you his calculations, which you have put up on your WWDL website, showing that, if the plant is being run as an extended aeration plant with nitrification and denitrification, then it does not have the capacity to treat much more than 450kg BOD per day, as well as oxidise the nitrogen compounds – not even the 1993 design load of 600kg per day. He has told you that often as much as up to 80% of the influent loads received just cannot have been treated and must have by-passed the plant in some fashion. If these loads were not treated and were discharged to the estuary, then they would clearly have been a huge source of pollution to the oyster beds and the consumers of our oysters, being discharged so close to the beds, as well as to the deterioration being observed year on year in the trophic status of the receiving waters of the Owenacurra Estuary and North Channel, which are now eutrophic.

We have always hoped that your engineers would work through the calculations to determine just how much BOD load can be treated with the oxygen available from the 2 x 30 kW blowers and also to come up with the other way of demonstrating the same by-passing of much of the Midleton sewage load, by carrying out a standard-practice sludge balance to calculate the theoretical sludge production to be expected, knowing the BOD and SS inputs over the month, when you will again have found that the Midleton sludge yield should be 45-50 tons TDS instead of the 10-20 tons TDS that are actually sent out by skip each month from the plant. You will remember that I brought John Mulready over to Johnstown Castle to answer any questions you might have had on both these approaches.

However, more directly, you can simply look at the fate of large loads that are recorded coming into the plant by the 30-minute proportional samplers, by following the suspended solids loads, which, being the insoluble components of the sewage, composed normally of about 40% not-easily-oxidised fibrous materials etc. and about 60% inorganic clays and silts, will eventually come out of the plant bound up in the floc of the activated sludge. We are told that the sludge age is at least 20 days, so unless there has been extraordinary activity in wasting and centrifuging, or large amounts have carried-over at the clarifiers, which would show up in the transmission records, we should

expect to find the presence of such large loads in the aeration tanks for some time. Remember that there is no primary sedimentation in Midleton, although this was required for the rest of the country for all new plants built after 1994 – i.e **6 years** before this plant was built.

The mixed liquor suspended solids (MLSS) in mg/l are recorded 2-3 times a week and given in the "Aeration Tank Checklist" on about page 17 of the WWTP Monthly Reports **(2)** and the Plant Operator actually calculates the mean values of the 8 tanks on the "Sludge Movement" record on the page before **(3).** Knowing the volume of the 8 tanks to be 3,249 m3, given in the "Plant Process Parameters" on page 14 **(4)**, the total biomass is the product of MLSS in mg/l x 3,249 m3/1000, as also calculated on page 14.

Case study 15.01.09

On 15th January 2009 a very large load was recorded at the time proportional influent sampler. The COD load, shown graphically on p.8 of the Monthly Report **(5)** and in detail in the "Influent Analysis" on p.9 **(6)** was 11,306 kg and the previously assessed COD:BOD ratio was 2:1, giving the BOD load as 5,653 kg (PE of 94,217). The SS solid load was 10,982 kg. The diary records, "*Influent very dirty and strong odour*".

The MLSS on 16th January after this load were 4,415 mg/l x 3,249/1000 = 14,344 kg
The MLSS on 12th January before this load were 4,303 mg/l x 3,249/1000 = 13,980 kg
Increase in the biomass following receipt of this huge load was just.....364 kg

Quite clearly something like 97% of this 10,982 kg load did NOT go to the aeration tanks.

Supporting evidence that this large load was by-passed:

1. Evidence of Total Nitrogen in the effluent

As you know, this plant works on a recirculation flow rate of 4 times DWF and 1 DWF returned activated sludge. As flow through the plant is by gravity, this means that a fifth of the nitrogen compounds, nitrified to nitrate and nitrite would be discharged through the clarifiers before returning to the anoxic zone for denitrification to gaseous nitrogen and yet this load - **nine times** the WWTP design capability- does not appear to have had any effect whatsoever on the total nitrogen content of the effluent **(7)**, which fell to its lowest point of the month that far (4.2 mg/l).

2. Evidence of a superabundance of Dissolved Oxygen (DO)

The high levels of dissolved oxygen in the aeration tanks given in the Aeration Tank Checklist **(2)** indicate that there must have already been little sewage in the aeration streams before the arrival of this load, but for the remainder of the month, after its "arrival", in tanks 2 and 7, there was so much oxygen that fish could have survived. On the 24th January in tank 2 you could even have introduced a few (more sensitive) trout and gone fly-fishing (DO 9.23mg/l). These are certainly not aeration streams struggling under the impact of a domestic sewage load nine times what they were designed for.

The plant daily diaries tell us that these "shock" loads are due to the cleaning out of the sumps in the storm tanks in Bailick 1 and 2. On this occasion we are told fitters were working in Bailick 2.

My consulting engineer and scientist advises me that such massive arrivals of BOD would require so much oxygen that the aeration streams would rapidly go anoxic and then septic. The plant would then be out of commission until it had been cleaned out and the correct aerobic and anaerobic bacteria had been re-seeded and the culture had grown. If the Plant Operator did not want this to occur, he would have had to by-pass a load like this one. We have only been given the MLSS levels since January 2002, but, since then, there are many examples of the sewage load being recorded at the splitter chamber, but either not reaching the aeration streams at all, as in this case, or, at times, probably being spotted when a small proportion of the load has got through. From comment in the plant diaries, there does not appear to have been much co-ordination of the County Council sending loads of sludges forward from the town pumphouse storm tanks to the Plant Operator at the WWTP, especially in the earlier years.

In 2005 only one BOD load greater than double the design load was allowed into the plant in the whole year and there was not a single SS load greater than 2,000kg/day. It may be significant that this was also the only time in the history of this plant that the oysters, from May to December, were not contaminated with norovirus. Examining the more recent results since that year, there was equally little effect on the biomass of the aeration tanks when SS loads of 5,300kg and 6,017kg arrived on 21st June 2006 and 20th August 2008 and a rise of only 20% in the MLSS for loads of 16,804 kg on the 24th & 25th September 2008; 6,384 kg on 30th June 2008 and 4,324kg on 8th December 2008. There have been numerous SS loads of over twice the norm at 2,000kg/day and also over 3,000 kg/day, after many of which, actual **falls** are registered in the MLSS after the entry of the load. I can provide you with the full list of these occasions if you wish.

May I remind you that it is not just my consulting engineer and scientist, who has said that this plant cannot cope with either the hydraulic or organic loads which are sent to it. The engineers who designed the plant, M.C.O'Sullivan's, who, incidentally, were involved in the design of Ringsend WWTP at exactly the same time, tried to get the County Council to add the third aeration stream – even before construction of the present plant was finished – or, they warned, it would be in danger of failing the Department of Marine's licence conditions. As their warning was not accepted, I take it that they are not responsible for the plant being built too small. I enclose this letter again **(8).**

We also have the minuted opinion of the Technical Director of EPS (the Plant Operator), saying that he would not accept responsibility for the performance of the plant if the County Council insisted he accept flows greater than 3,248m3/day (1.44DWF), which means, as the daily flow to the plant is normally twice this, that EPS are not accountable for any failures in performance. I also enclose this letter again **(9).**

When the hydraulic and organic loading on this plant is so far astray that the plant chemistry just cannot work out, isn't it very misleading that you allow the impression to persist that this WWTP is not failing, when, knowing all that we have pointed out to you over so many years, you still do not search any further than these most improbable effluent results?

Storm overflows.

Having said that, you do put a small rider in the middle of paragraph 2.3.1 of your Report, "*While the effluent quality from secondary treatment plants may demonstrate compliance with the requirements of the Urban Waste Water Treatment Regulations, storm overflows upstream of the plant may not be in compliance with requirements of the Regulations.*" However, many of the readers of your Report will have missed this. Your Report will surely be being read with the purpose of seeing if all is well with the environment into which these WWTP's are discharging and, to the public, this must mean the totality of the discharge parameters, especially if this alters the picture so markedly from that obtained simply through using the single parameter of effluent results. As I have shown above, it would seem to be very misleading to confine yourselves to this single parameter in the case of Midleton, when I have alerted you to so much else going wrong over the years, including the WWDL material that I have sent you to put up on your WWDL website, under Ref. No. D0056-01.

I note that you list two Section 63 notices you have served on Cork County Council on storm overflows and that your notes say that you look forward to any infiltration in the sewerage system being reduced. I understand over €2m was spent in 2007 on repairing sewers and the new Dwyer's Road pumping station (to cut out the pipe to Bailick 1 pumphouse, which ran under the river and was leaking). I have already alerted you to the fact that, very regrettably, this expenditure appears to have had only marginal success, with the results from several months, following the remediation work, still giving average daily storm overflow volumes of over 2,000 tons per day (60,000 tons per month). In December 2006 a staggering 155,327 tons of sewage overflowed into the Owenacurra River – that was an average of over 5,000 tons per day. This is the month when the continent celebrates Christmas and the New Year with a treat of oysters and accounts for over half of the sales of oysters in France. How lucky that the oyster fisheries of the North Channel and Rostellan were shut down that year.

The storm overflows for the two years you examined here, 2006 and 2007, are included in the table below:

Summary of annual overflow data of Midleton, Co. Cork sewerage system.

Year	Rainfall	Combined overflows			Bailick 1		Bailick 2	
	(mm)	Total no. of overflows >40m3/day	Total volume of overflows m3 (tons)	Average overflow per day m3 (tons)	Number of overflows >40m3/day	Volume m3 (tons)	Number of overflows >40m3/day	Volume m3 (tons)
2002	1,264	193	333,216	913	139	315,299	54	17,917
2003	908	117	117,954	323	95	110,224	22	7,730
2004	1,011	131	186,640	510	89	152,643	42	33,997
2005	1,014	280	314,371	861	140	259,953	140	54,418
2006	1,140	387	394,796	1,082*	158	294,380	229	100,416
2007	958	342	277,409	760	125	187,690	217	89,719
2008	1,076	385	323,886	887	183	260,871	202	63,400
Av. of 7 years	1,053	262	278,325	762	929	225,865	129	52,514

*an average of 1,000 tons/day **over the entire year.**

Data for winter 2006/07

Month	Year	No. >40m3	Total vol. m3 (tons)	Av. spills/day no.	Av.vol/day m3 (tons)	Max. spill vol/day m3
October	2006	55	64,272	1.8	2,073	**13,154**
November	2006	57	75,589	1.9	2,520	**14,281**
December	2006	62	155,327	2.0	5,011*	**16,769**
January	2007	50	52,891	1.6	1,706	**3,668**
February	2007	53	80,202	1.9	2,864	**10,519**
March	2007	57	68,022	1.8	2,194	**10,876**
Average		**56**	**82,717**	**1.8**	**2,271**	** see note

* Very dangerous for the Christmas and New Year oyster market, which accounts for 80% of French sales.

** It must be remembered always that a single pollution event that leaves oysters contaminated with human norovirus means that those oysters remain infectious to consumers for the next 6 weeks (EU) to 8 weeks (US FDA).

After the infiltration remediation work, which finished in September 2007, the storm overflow position has been just as bad in the following months:

Month	Year	No. >40m3	Total vol. m3 (tons)	Av. spills/day no.	Av.vol/day m3 (tons)	Max. spill vol/day m3
January	2008	54	76,131	1.7	2,456	12,343
August	2008	45	63,200	1.5	2,039	5,805
September	2008	47	72,441	1.6	2,415	5,933
January	2009	41	63,580	1.3	2,051	16,497
February	2009	40	66,294	1.4	2,368	12,307

Your consultee bodies will probably not be aware that Prof. O'Kane of the Civil Engineering Department, UCC, carried out a hydrodynamic survey to determine the likely effect of different sewage discharges on the norovirus (winter vomiting bug) contamination of the oyster beds in the North Channel of Cork Harbour, though they will find this study on your WWDL website. He concluded that, now that Carrigrennan WWTP is treating the City sewage, the storm water overflows from the Bailick 1 & 2 storm tanks are a significant source of the pollution of the oyster beds and the most important source of pollution in the summer months.

I have included a further column above, which I have not given you before, on the maximum storm overflow volumes that occurred during these bad months. You will see that, on occasion, the volume of crude (see note below*) sewage pumped to the river was about **twice** the normal amount of 6,000-7,000 m3/day pumped to the treatment and up to **five times** the volume the Plant Operator has said he can accommodate at this plant **(see (9) above).**

***Note**. I enclose a table of all the paired observations made over the years in Midleton when the f.c. content of storm-water could be compared to the f.c. content of the crude sewage entering the WWTP itself **(10)**, which I hope dispels the myth that storm overflows are only very dilute sewage. You will see that despite the very large overflows that are being pumped from the storm tanks, the*

f.c. concentration is actually greater in this flow to the river than what is being pumped to the WWTP on the same day on 17 out of these 64 paired samples (27% of the time). For the frequent occasions since 2006 when the storm tank has been allowed to stay full indefinitely, I add here these results from January 2008 to give a snapshot of the comparison:

Faecal coliform concentration of influent to WWTP and storm tank overflows to river.

Date	*Influent to WWTP (f.c./100ml)*	*Storm overflows to river (f.c./100ml)*
04.01.08	*7,000,000*	*4,000,000*
11.01.08	*520,000*	*1,800,000*
18.01.08	*<1,000,000*	*20,000,000*
25.01.08	*2,100,000*	*1,500,000*

Unrecorded "gravity" overflows to the river

In his report, Prof. O'Kane included pictures of the high-water marks in the Bailick 1 storm tank which showed that, from time to time, the water level had been above the level of the four open 600 x 600mm opes to the river and he comments that sewage must have therefore flowed out into the river by gravity. The storm tank was designed to be able to operate like this, as is explained in the 1993 Preliminary Report:

4.8.9 "Due to the necessity to protect the low lying areas of Midleton Town against flooding (30 year flood), it is necessary to have quite a low storm overflow level. This level is a mere 600 mm. over existing bed level of the Owenacurra River adjacent to the pumphouse site.

4.8.10 "Because of this, the storm water balancing tank has been designed in such a way that if the capacity of the tank is filled (each of the three compartments fill in series and give the longest possible path to aid settlement) before overflow begins and if water levels in the receiving waters adjacent are low enough, then this overflow operates by gravity. If, however, water levels in the receiving waters are too high, then the overflowed liquid will overflow further into a Storm Water Pump Sump from where the storm water will be lifted to discharge to the tide. It should be noted that all discharges will receive fine screening."

Such gravity flows would be unrecorded by the running hours of any pump.

Often such gravity flows have been masked by the almost daily running of the storm pumps, but there are still many days when effluent is recorded as flowing into the storm tanks, with the weir section recording over, say, 20 hours flow, into, especially from 2006 onwards, already full storm tanks, **without** the storm pumps coming on. This cannot, of course, happen unless there is flow out. Details of these days are in my WWDL submission on your website. The weir section recorder was disconnected, or broke down for 12 months from Feb. 2007 to March 2008, and again from January 2009 to date, but there is enough data to confirm Prof. O'Kane's observation.

Incidentally, the weir section recorder, which indicated a similar regime was in operation in Bailick 2, was also disconnected, or broke down from January 2009.

Unrecorded sources discharge over a million tons p.a. of untreated effluent at Rathcoursey Point (30% of the total discharge), between the North Channel and Lower Harbour oyster beds.

The flow to the primary discharge point at Rathcoursey point from the final pumphouse in the sewerage network at Ballinacurra 1 is recorded daily by the County Council curator, as are the flows from all the other pump houses. I have the records going back for the last 20 years to 1989.

The flow to Ballinacurra 1 is made up of the treated domestic effluent from the WWTP and the industrial effluent from Irish Distillers. As you know, Irish Distillers now meter all their effluent (treated + UV, and also cooling water) and thus we know that this is joined by about 500m3/day from other sources, or infiltration (this sewer was also repaired in the infiltration remediation programme). I enclose a table **(11)** for 2002-2007, which shows that these two flows (treated domestic sewage and the industrial flow), which should add up to what is pumped on to Rathcoursey Point, are in fact joined by other flows varying between 3,000 – 5,000 m3/day and averaging about 3,500m3/day. What we can say with certainty is that these daily flows, totalling about 1.3 million m3 (or tons) of effluent p.a. and representing about 30% of the total discharge from Midleton, are untreated and are released within an hour on the tide of the oysters beds upstream and downstream. Note also the calculation for the average total daily flow of domestic effluent in the sewerage system, which is over 10,000m3/day – 4 times the design DWF. The domestic flow can, however, reach as much as 30,000 m3/day (3 DWF).

All the evidence seems to show that as much hydraulic and organic load as possible is being lost from the Midleton sewerage system, in a variety of ways, in order to keep a grossly under-designed WWTP in operation and that this plant provides little more than a cosmetic front, to which the single parameter of effluent analysis taken in isolation, which you have taken to define performance for your Report for 2006-2007, only unfortunately adds credence.

This is borne out by the continuous contamination of the oysters with human norovirus. All the results I have been sent this year by the Marine Institute show the virus at the highest level for both genogroups. This means that oysters taken from these waters MUST cause illness, unless they get relaying first in clean water for 2 months.

I hope that the evidence that I have presented here, together with all that I have sent to you in the past, will be sufficient submission to request you to investigate the environmental damage, which is continuing daily to Sensitive Waters and now also to two designated Shellfish Waters.

Nutrient additions to a sensitive area.

Since Carrigrennan WWTP came on stream to treat Cork City sewage, water quality in Lough Mahon has improved from eutrophic in the period 1993-2003, to potentially eutrophic in 2001-2005, to intermediate status in 2006. The Owenacurra Estuary/North Channel, on the other hand, was downgraded from potentially eutrophic in 1995-1999 to eutrophic in 1999-2003 and was classed as a Sensitive Area by S.I. No. 440 in 2004.

As well as the untreated sewage sources that I have outlined above, my consulting engineer and scientist is confident that very little denitrification, if any, takes place in the anoxic tanks in the Midleton WWTP. He advises me that the rather uncommon extended aeration system that was put in for Midleton is the Modified Ludzack-Ettinger (MLE) process. The process requirements for de-

nitrification are anoxic conditions and a source of rapidly biodegradable organic matter. Anoxic refers to the presence of combined oxygen (nitrate and nitrite) and the **absence** of free or dissolved oxygen.

The MLE equation for the rate of denitrification (Rdn) is:

Rdn = rdn x $1.09^{(T-20)}$ x (1 - DO) x Xv of which the important factor to note, in this instance, is the *(1 - DO). If the DO is greater than 1mg/l, the factor will become a minus quantity and no de-*nitrification takes place.

I have already drawn your attention to the large (and wasteful) surplus of DO in the tanks – often enough to even support fish life, but in these conditions, no denitrification will take place. This means that the nitrogen in the treated effluent will largely be being discharged as nitrate and nitrite, both of which, of course, are soluble and highly eutrophic.

As well as this, you must appreciate the importance of retention time to the de-nitrification process. It is stressed, for instance, even in the Plant's Design Engineers' letter of 24th November 1999 **(8),** *"To ensure that the retention time in the Garryduff Treatment Plant is maintained* ***to ensure full denitrification is achieved*** *the volume of the Dawn Meats Plant is the critical factor."* This extra volume that led them to urge the rapid addition of the third aeration stream in 1999 was 550m3/day. The Midleton WWTP has been receiving 6 times this additional 550m3/day = 3,300m3/day more than the design DWF every day continuously from the start. If 3DWF goes through the plant then the retention time is cut to a third and, as you know, the hydraulic flow through this plant can be anything from 2.5-3.3 DWF – never ever less.

The standard procedure for assessing the de-nitrification efficiency of this type of plant is, of course, by monitoring the amount of nitrate left behind in the effluent. As it is unlikely that this WWTP has ever de-nitrified in its lifetime, it is probably not surprising that the nitrate figure for the effluent has been omitted. From April to August 2001 we were, however, given the nitrate concentration of the influent, which, as you would expect, being such an easily removed oxygen source for bacteria in the drains, was very low (< 1mg/l). Influent nitrate was then given to us spasmodically from October 2001 till August 2003. It then varied from about 10 mg/l to 811 mg/l. This nitrate must have been coming from the sludge dewatering and centrifugate returning to the inlet works after the PFT and centrifuge - very diluted by the bulk of the new nitrate-free influent – and thus this gives some idea of the vast amount of nitrate being discharged to the estuary, which, together with the untreated sewage discharged by the three mechanisms above, would go a long way to explaining the deterioration in water quality of the North Channel and Owenacurra waters.

I would ask that the columns for nitrite and nitrate on the effluent results page in the EPS Monthly Reports are now filled in and given to us all – and, of course, that these should be subject to spot verification by yourselves. David Smith, in your first Section 63 Notice of 8th July 2004, raised the question of the external laboratory analyses being taken on the same days each week, *"The effluent quality as reported by EPS is based on sampling carried out weekly on Thursday and Friday. This sampling schedule will not show the biological demand on the plant after a weekend, when loads are expected to be higher"*, and, *"The current schedule of sampling should be randomised, in*

particular to include samples following increased flows to the plant", but the suggestion by yourselves to make changes was never enforced. I don't believe the EPA has ever taken snap samples or carried out a snap inspection, which would be the expected practice elsewhere and would give much greater confidence in the results.

While on this important subject of monitoring, you will appreciate the advantage of measuring chloride in the influent as well as effluent, as, being inert, this is a useful tool for checks and balances and it would be useful to ask for this to be done – again, as it is done routinely elsewhere.

My consulting engineer and scientist also wonders what on earth the purpose is of measuring the Sludge Volume Indices (SVI's) in tanks 1 and 5 (see the Aeration Tank Check List **(2)**) instead of the final tanks 4 and 8 where estimates of settleability are needed. They are meaningless in the first tanks where the crude influent and all the recirculated mixed liquor (4DWF) together with 1DWF returned settled activated sludge are all pouring in.

European Communities (Environmental Liability) Regulations 2008. S.I. No. 547 of 2008.

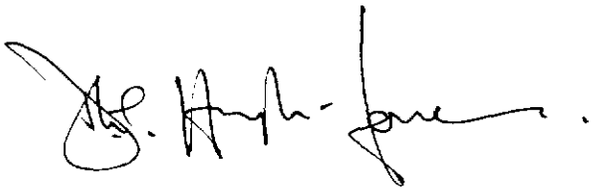
I would be very grateful if, as a person whose business (and the jobs of 20 others) has been closed down by this instance of environmental damage, I may now request you to perform your functions under these regulations. I have submitted my observations on three significant ways in which untreated sewage from Midleton is being discharged to the sensitive waters of the Owenacurra Estuary and the North Channel and to the two recently designated shellfish waters of the North Channel and Lower Harbour and also the further mechanisms by which the chemical status of these water bodies has deteriorated because of the gross overloading and under-design of this plant.

Sections 9 and 11 of the Regulations dealing with what should happen where environmental damage is deemed to have occurred, both specify the importance of damage or risk to human health and in Schedule 1 it is also stated that, "*Damage with a proven effect on human health must be classified as significant damage.*" In Schedule 2, on the remedying of environmental damage, it states at the end of section 1, "*Remedying of environmental damage, **in terms of damage to water** or protected species or natural habitats, also implies that any significant risk of human health being adversely affected is removed.*" I would ask you to remember, in assessing the gravity of this particular environmental damage, that the discharge of untreated, or only partially treated sewage, over oyster beds where no cooking is involved in the consumption of the product, has already led to over one thousand people reporting food-poisoning from Cork oysters. It is also thought that, with the sickness and diarrhoea caused by norovirus, as few as one in thirty may in fact report their illness and thus as many as 30,000 people may have suffered very unpleasant ill-health as a consequence of the very poor disposal systems put in for Midleton's sewage before and after the construction of the WWTP – and clearly with the problem worsening to this day, with the 2009 norovirus results recorded at their highest level.

I would be very grateful for your acknowledgement of receipt of my request; for your advice on the steps that you will be taking and the time-table that you will set to perform your functions under the Regulations. Should you find that the Midleton WWTP is not, after all, complying with the UWWTD, I would also be very grateful if you would make this clear to me and to the other interested parties, whom I have copied into this correspondence.

In the meantime, please let me know if I can provide you with any further information.

Yours faithfully,



D. Ll. Hugh-Jones

Copies to:

The Marine Institute, Oranmore, Co. Galway.
The Marine Institute, 80 Harcourt Street, Dublin 2.
The Sea Fisheries Protection Authority
Food Safety Authority of Ireland
Bord Iascaigh Mhara
South Western Regional Fisheries Board
Southern Health Board
Irish Shellfish Association
Prof. O'Kane, Civil Engineering Department, UCC.
Legal Unit, European Commission, Brussels.

Also to:
Office of Climate, Licensing and Resource Use, EPA, for inclusion as a further submission re D0056-01 Midleton Waste Water Discharge Licence Application.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
5		No. of times in the month the design			These values used in EPA surveys (sensitive areas)														
6		load (10,000PE) was exceeded, using			Published effluent results					F A I L U R E S					*all SS samples, that were not zero, counted				
7		on-site and ext. lab. influent records			Monthly averages taken fron EPS Monthly Reports					COD	BOD	SS	TN	TP	N U M B E R O F S A M P L E S T A K E				
8	DATE	*>12,000 PE	>20,000 PE	>30,000 PE	COD	BOD	SS	TN	TP	>125	>20	>30	>15	>2	COD	BOD	SS*	TN	TP
55	Aug-05	2				2.0	11.1	2.0	1.0	0	0	0	0	0	22	8	19	8	8
56	Sep-05	1				2.7	8.1	2.8	0.4	0	0	0	0	0	21	10	16	10	10
57	Oct-05					2.8	9.6	3.4	0.3	0	0	0	0	0	20	8	19	8	8
58	Nov-05					2.0	4.1	2.6	0.5	0	0	0	0	0	22	8	22	8	8
59	Dec-05	2				2.2	5.0	2.0	0.3	0	0	0	0	0	19	9	19	9	9
60	**AV-2005**					**2.6**	**7.6**	**2.6**	**0.5**										
61	Jan-06	2	1			2.0	3.7	2.1	0.5	0	0	0	0	0	19	8	19	8	8
62	Feb-06	6				2.6	5.1	2.3	0.6	0	0	0	0	0	19	8	19	8	8
63	Mar-06	14	1			2.0	6.1	2.0	0.5	0	0	0	0	0	22	9	22	9	9
64	Apr-06	10				2.1	4.7	2.1	0.9	0	0	0	0	0	17	7	18	7	7
65	May-06	12				2.0	4.6	3.1	0.6	0	0	0	0	0	20	8	22	8	8
66	Jun-06	4		1		2.6	9.0	3.5	0.7	0	0	0	0	0	19	10	20	10	10
67	Jul-06	6				2.1	10.5	2.6	0.4	0	0	1	0	0	21	8	21	8	8
68	Aug-06	2				3.0	24.9	7.4	1.6	0	0	5	0	2	17	8	20	8	8
69	Sep-06	1	1			3.0	10.7	2.3	0.4	0	0	0	0	0	15	5	15	7	7
70	Oct-06	2				2.0	11.8	2.6	0.5	0	0	0	0	0	19	4	16	8	5
71	*Nov-06	1			21.8	2.5	5.6	3.6	0.3	0	0	0	0	0	20	4	20	7	5
72	Dec-06	2			15.6	3.0	2.4	3.9	0.4	0	0	0	0	0	17	4	17	8	6
73	**AV-2006**				**18.7**	**2.4**	**8.3**	**3.1**	**0.6**										
74	Jan-07	11			18.4	2.3	2.2	5.1	0.5	0	0	0	0	0	20	4	20	8	5
75	Feb-07	5	1		19.8	2.5	3.2	4.1	0.6	0	0	0	0	0	17	4	17	8	5
76	Mar-07	5			19.0	2.0	3.0	4.1	0.7	0	0	0	0	0	21	5	21	10	6
77	Apr-07	7	1		19.0	2.0	4.0	3.2	0.5	0	0	0	0	0	11	4	11	8	5
78	May-07	13	4	2	25.1	2.5	4.8	2.7	1.0	0	0	0	0	1	20	4	20	9	6
79	Jun-07	4	7	2	36.9	3.0	12.0	1.9	0.4	0	0	0	0	0	19	5	19	9	5
80	Jul-07	4	4		26.0	3.5	6.7	1.9	0.7	0	0	0	0	0	22	4	22	8	5
81	Aug-07	17	3		23.0	3.4	5.0	2.2	0.3	0	0	0	0	0	23	5	21	8	3
82	Sep-07	8	3	2	20.7	4.0	10.8	1.8	0.8	0	1	0	0	0	19	3	19	7	4
83	Oct-07	4	1		17.6	3.5	18.0	2.3	0.4	0	0	2	0	0	22	4	22	8	4
84	Nov-07	4			23.2	2.8	11.9	2.3	0.3	0	0	0	0	0	21	4	21	7	6
85	Dec-07	9	3		20.2	3.5	6.9	2.2	0.3	0	0	0	0	0	16	4	16	7	5
86	**AV-2007**				**22.4**	**2.9**	**7.4**	**2.8**	**0.5**										
87	Jan-08	5	1	1	18.1	5.5	7.0	3.0	0.6	0	0	0	0	0	21	4	21	9	6
88	Feb-08	6			17.7	4.2	11.2	3.7	0.6	0	0	0	0	0	17	5	17	9	5
89	Mar-08	8	1	1	20.0	3.0	10.0	3.4	0.5	0	0	0	0	0	17	4	17	8	5
90	Apr-08	5		1	20.0	4.0	8.0	3.1	0.6	0	0	0	0	0	20	4	20	8	5
91	May-08	8			20.9	2.6	9.7	3.2	0.7	0	0	0	0	0	20	5	20	10	6
92	Jun-08	8	1	2	24.0	2.5	11.4	3.1	0.4	0	0	0	0	0	20	4	20	8	5
93	Jul-08	8	1	1	24.0	4.0	11.3	2.3	0.3	0	0	0	0	0	21	4	21	9	6
94	Aug-08	4	1		19.0	3.2	10.8	1.9	0.4	0	0	0	0	0	19	5	19	8	5
95	Sep-08	2	1	2	17.0	3.0	9.9	3.2	0.4	0	0	0	0	0	15	4	15	7	4
96	Oct-08	15	2		18.0	3.2	8.9	2.9	0.4	0	0	0	0	0	20	5	19	10	6
97	Nov-08	4	4	2	15.0	3.0	6.8	3.4	0.5	0	0	0	0	0	19	4	19	8	5
98	Dec-08	5	2	3	17.7	4.0	6.2	4.8	0.3	0	0	0	0	0	11	4	11	7	5
99	**AV-2008**				**19.3**	**3.5**	**9.3**	**3.2**	**0.5**										
100	**AV 2002-07**				**20.7**	**3.3**	**9.4**	**3.5**	**0.6**										
101	**Number of failures in total number of samples**									**0**	**7**	**27**	**0**	**3**	**1479**	**617**	**1374**	**687**	**604**
102	**% failure**									**0.0%**	**1.1%**	**2.0%**	**0.0%**	**0.5%**					
103																			
104	* Results taken from EPS averages now given each month in the Monthly Reports														**overall 40 failures in 4761 samples .... 0.84% failure rate**				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	**Effluent results 2002-09 from External Laboratory Analysis i.e. declared results**																		
2	*Letter of 24.11.99 from M.C.O'Sullivans, Consulting Engineers to the County Council, "It must be borne in mind that if the plant was overloaded by 20% or more there would be danger of not complying with																		
3	Department of Fisheries discharge licence" - this would equate to a BOD load of >12,000 PE. The hydraulic load is always 2.5 to 3.3 TIMES the design DWF.																		
4																			
5		**No. of times in the month the design**								These values used in EPA surveys (sensitive areas)									
6		**load (10,000PE) was exceeded, using**			**Published effluent results**					**F A I L U R E S**					*all SS samples, that were not zero, counted				
7		**on-site and ext. lab. influent records**			**Monthly averages taken from EPS Monthly Reports**					**COD**	**BOD**	**SS**	**TN**	**TP**	**N U M B E R O F S A M P L E S T A K E**				
8	**DATE**	***>12,000 PE**	**>20,000 PE**	**>30,000 PE**	**COD**	**BOD**	**SS**	**TN**	**TP**	**>125**	**>20**	**>30**	**>15**	**>2**	**COD**	**BOD**	**SS***	**TN**	**TP**
9	Jan-02	6	6	1		2.0	7.4	10.8	0.5	0	0	0	0	0	20	4	20	4	4
10	Feb-02	5				2.0	6.3	5.5	0.3	0	0	0	0	0	18	5	13	2	2
11	Mar-02	2	2	2		6.4	17.9	6.9	0.7	0	0	1	0	0	14	7	14	7	7
12	Apr-02	4	2	1		2.1	5.6	4.9	0.2	0	0	0	0	0	19	7	17	7	7
13	May-02	3	2	1		2.1	5.1	3.2	0.5	0	0	0	0	0	14	8	10	8	8
14	Jun-02	7	3			2.4	8.1	5.3	0.6	0	0	0	0	0	18	8	11	8	8
15	Jul-02	3	2			2.4	5.3	1.9	0.5	0	0	0	0	0	18	8	13	8	8
16	Aug-02	8	2			2.5	10.5	2.2	0.4	0	0	0	0	0	20	10	10	10	10
17	Sep-02	8	3	1		2.1	9.6	2.1	0.6	0	0	0	0	0	21	8	13	8	8
18	Oct-02	10	1	1		2.2	7.8	2.6	0.6	0	0	0	0	0	22	9	16	9	9
19	Nov-02	4		2		2.3	4.6	5.5	0.9	0	0	0	0	0	20	8	10	8	8
20	Dec-02	10				2.8	4.5	4.5	0.4	0	0	0	0	0	19	5	13	5	5
21	**AV-2002**					**2.6**	**7.7**	**4.6**	**0.5**										
22	Jan-03	12	2	1		2.5	5.7	6.8	0.5	0	0	0	0	0	22	10	21	10	10
23	Feb-03	8	6	3		2.1	4.5	6.2	0.5	0	0	0	0	0	19	7	16	7	7
24	Mar-03	5	2	1		2.5	5.2	2.0	0.6	0	0	0	0	0	18	8	11	8	8
25	Apr-03	5	4			3.1	7.0	5.0	0.2	0	0	0	0	0	17	8	10	8	8
26	May-03	8	1			2.5	6.9	5.6	0.3	0	0	0	0	0	21	10	16	10	10
27	Jun-03	7		3		3.0	8.8	4.3	0.3	0	0	0	0	0	17	8	9	8	8
28	Jul-03	12		1		3.5	14.5	2.9	0.5	0	0	1	0	0	20	8	15	8	8
29	Aug-03	12	2	1		3.3	13.8	2.6	0.5	0	0	0	0	0	9	9	9	9	9
30	Sep-03	11	2			3.3	10.1	2.4	0.6	0	0	0	0	0	8	8	8	8	8
31	Oct-03	15		1		3.8	14.4	3.3	0.8	0	0	0	0	0	10	10	10	10	10
32	Nov-03	15	2	1		3.8	12.1	2.0	0.6	0	0	1	0	0	8	8	8	8	8
33	Dec-03	15	1	2		4.9	18.7	2.7	0.8	0	0	1	0	0	10	10	10	10	10
34	**AV-2003**					**3.2**	**10.1**	**3.8**	**0.5**										
35	Jan-04	16	2			14.5	36.5	4.8	1.1	0	1	4	0	0	8	8	8	8	8
36	Feb-04	14	4			5.5	21.0	5.4	1.0	0	0	2	0	0	8	8	8	8	8
37	Mar-04	12	4	2		6.6	20.5	3.6	0.9	0	0	1	0	0	8	8	8	8	8
38	Apr-04	15	2	1		3.9	11.8	4.1	0.5	0	0	0	0	0	10	10	10	10	10
39	May-04	13	3	1		3.3	10.0	3.2	0.6	0	0	0	0	0	6	6	6	6	6
40	Jun-04	9		1		2.8	12.3	3.0	0.6	0	0	0	0	0	8	8	8	8	8
41	Jul-04	6				11.5	18.8	6.6	1.4	0	4	4	0	0	22	22	22	10	10
42	Aug-04	3				6.2	10.3	2.3	0.8	0	0	0	0	0	20	20	20	8	8
43	Sep-04	3				6.5	9.2	2.8	0.5	0	0	0	0	0	21	21	21	9	9
44	Oct-04	9	1			3.7	15.0	3.2	0.5	0	0	0	0	0	20	9	20	9	9
45	Nov-04	3				4.8	10.0	6.1	0.7	0	0	2	0	0	20	9	20	9	9
46	Dec-04	3				3.3	9.7	5.7	0.3	0	0	0	0	0	14	7	14	7	7
47	**AV-2004**					**6.1**	**15.4**	**4.2**	**7.4**										
48	Jan-05	2				3.3	8.6	3.3	0.5	0	0	0	0	0	16	8	16	8	8
49	Feb-05	3				3.0	5.8	2.4	0.4	0	0	0	0	0	18	8	18	8	8
50	Mar-05	3				3.1	8.7	3.3	0.6	0	0	1	0	0	16	10	18	10	10
51	Apr-05	5				3.2	8.7	3.1	0.4	0	0	1	0	0	19	9	19	9	9
52	May-05	1	1			2.8	7.4	2.0	0.6	0	0	0	0	0	21	9	21	9	9
53	Jun-05					2.2	5.7	2.0	0.4	0	0	0	0	0	21	9	21	9	9
54	Jul-05	1				2.0	8.4	2.6	0.8	0	0	0	0	0	21	9	21	9	9

Aeration Tank Checklist - January 2008 -

Date	Time	Tank 1			Tank 2		Tank 3		Tank 4		Tank 5			Tank 6		Tank 7		Tank 8	
		DO mg/L	SVI	MLSS mg/L	DO mg/L	MLSS mg/L	DO mg/L	MLSS mg/L	DO mg/L	MLSS mg/L	DO mg/L	SVI	MLSS mg/L	DO mg/L	MLSS mg/L	DO mg/L	MLSS mg/L	DO mg/L	MLSS mg/L
01-Jan		0.00			2.11		2.08		1.37		0.00			2.7		4.1		2.95	
02-Jan		0.00	203	3940	2.28	4570	3.6	4504	1.61	4542	0.00	195	4154	3.53	3846	4.50	4052	2.62	3976
03-Jan		0.00			3.76		1.75		0.95		0.00			2.83		2.45		0.87	
04-Jan		0.00			2.35		4.04		3.30		0.00			1.4		3.75		4.41	
05-Jan		0.00	161	5018	2.50	4884	4.81	4752	1.15	4936	0.00	204	4008	2.56	4152	3.1	4136	2.53	4224
06-Jan		0.00			4.62		3.35		1		0.00			3.85		4.15		1.71	
07-Jan		0.00			3.84		3.82		0.84		0.00			3.1		5.04		4.32	
08-Jan		0.00			3.45		3.00		2.49		0.00			5.31		1.08		1.19	
09-Jan		0.00	174	4610	1.64	4808	3.29	4788	1.64	4728	0.00	219	3558	1.57	4578	1.81	3980	3.73	4004
10-Jan		0.00			6.35		4.43		0.99		0.00			3.07		4.22		2.25	
11-Jan		0.00			5.07		4.00		0.86		0.00			3.76		1.12		3.98	
12-Jan		0.00	169	4722	5.75	4998	2.08	4420	1.06	4424	0.00	213	3898	1.57	3988	1.25	4128	2.15	3850
13-Jan		0.00			4.51		2.97		0.87		0.00			2.81		0.28		4.35	
14-Jan		0.00			2.88		6.03		0.92		0.00			4.1		0.12		2.08	
15-Jan		0.00			6.15		6.44		0.74		0.00			2.00		1.46		1.84	
16-Jan		0.00	169	4728	5.56	4504	1.97	4486	1.27	4570	0.00	138	5706	1.33	3868	1.79	3846	1.3	3816
17-Jan		0.00			3.53		2.13		3.49		0.00			1.62		5.42		3.34	
18-Jan		0.00			5.43		2.33		1.55		0.00			0.96		5.94		3.10	
19-Jan		0.00	189	4340	5.77	4452	2.89	4362	2.33	4424	0.00	194	4126	0.65	4258	5.32	4364	2.10	3928
20-Jan		0.00			3.45		3.23		1.50		0.00			3.33		3.14		1.18	
21-Jan		0.00			6.69		5.03		2.28		0.00			1.39		4.87		0.62	
22-Jan		0.00			5.36		1.84		2.05		0.00			1.53		6.86		1.81	
23-Jan		0.00	159	4594	5.36	4408	2.34	4386	3.88	4388	0.00	196	4080	1.82	3838	5.42	3958	2.57	3924
24-Jan		0.00			9.23		4.41		1.17		0.00			1.28		6.91		2.43	
25-Jan		0.00			6.85		2.37		1.33		0.00			1.02		6.55		2.2	
26-Jan		0.00	166	4516	7.19	4188	2.69	4346	0.67	4196	0.00	205	3898	2.87	4078	0.95	4150	1.54	5858
27-Jan		0.00			5.90		2.19		0.9		0.00			2.18		6.24		1.31	
28-Jan		0.00			5.51		2.97		0.29		0.00			3.48		5.36		1.97	
29-Jan		0.00			7.05		2.39		0.89		0.00			4.38		6.27		1.58	
30-Jan		0.00	214	3732	5.67	3890	2.21	3774	3.06	4128	0.00	199	4054	2.43	4180	4.33	4124	1.59	4224
31-Jan		0.00			6.69		3.7		2.04		0.00			4.08		4.29		2.14	

Legend: Weekend Holiday

Midleton WWTP
Operational Report - EPS

Sludge Movement January 09

Date	n.Skips Removed	Skip Weight (kg)	%Dry Solids Post PFT	%Dry Solids Post Centrifuge	Mixed Liquor Suspend Solids	Quantity of Poly (L)	Certificate of Origin	Receipt of Delivery
01-Jan								
02-Jan	1	5880			4310	10	6850	4049
03-Jan								
04-Jan								
05-Jan	1+1	5840;5260			4514	20	6844;7001	4055;4053
06-Jan	1	5240	3.1	15.2		10	6845	4060
07-Jan	1+1*	6420;1900				10	6846;6420	4073
08-Jan	1	5800				10	6848	4080
09-Jan	1+1	5560;6040			4379	20	6849;7002	4089;4092
10-Jan								
11-Jan								
12-Jan	1	5180			4303	10	7004	4096
13-Jan	1	5280				10	7003	5280
14-Jan	1	5540	2.7	16.2		10	7005	4113
15-Jan	1	5620				10	7006	4121
16-Jan	1+1	5640;5520			4415	20	7007;7008	4135;4144
17-Jan								
18-Jan								
19-Jan	1	5380			4282	10	7009	4146
20-Jan	1	5140	3.0	15.3		10	7010	4151
21-Jan	1	4760				10	7011	4163
22-Jan	1	4840				10	7012	4164
23-Jan	1+1	5100;6200			4197	10	7013;7014	4176;4181
24-Jan								
25-Jan								
26-Jan	1	6260	3.5	16.2	4403	10	7015	4185
27-Jan	1	5920				10	7016	4192
28-Jan	1	5240	3.0	13.4		10	7017	4201
29-Jan	1	5580	3.0	14.1		10	7018	4211
30-Jan	1+1	6160;5560	3.0	14.9	4013	20	7019;7020	4218;4224
31-Jan								
Total		**144960**				**250**		
Average		**14163.8**	**3.1**	**15.0**	**4312.8**			

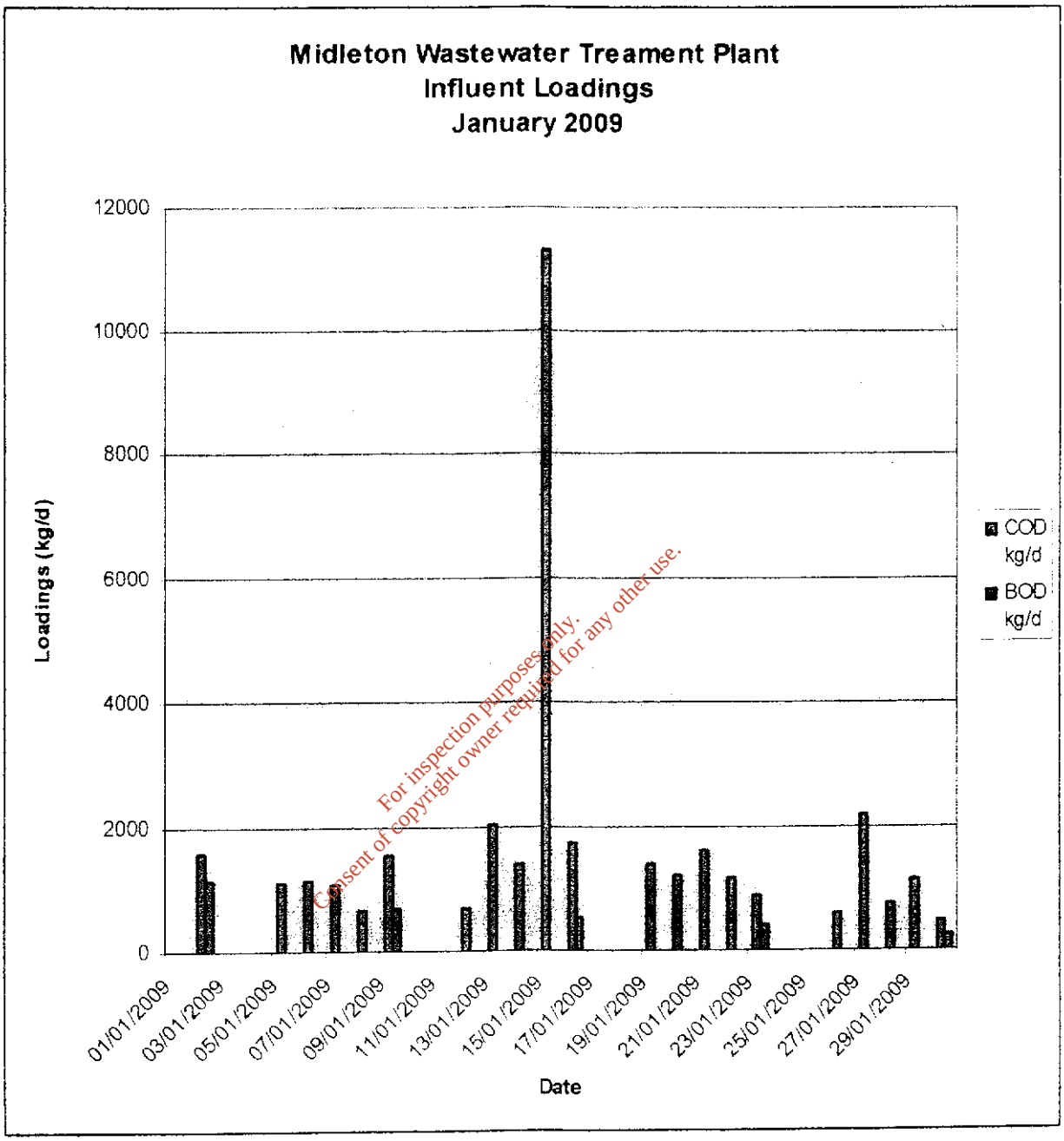
Plant Process Parameters
January 2009

Process Calculations

Process Calculations - Janurary 2009 -

Period Covered: 1st - 31st Janurary 2009

	Value	Unit
Plant Volume	3249	m3
MLSS	4312	mg/L
Total Biomass	14009.7	kg
Daily Sludge Wastage	701.4	kg/d
Sludge Age	20	days
Daily BOD Load	417.0	kg/d
Daily Sludge Wastage	701.4	kg/d
Sludge Yield	1.7	kg sludge/kg BOD
Daily BOD Load	417.0	kg/d
Total Biomass	14009.7	kg/d
F/M Ratio	0.03	
Average Sludge Cake	15	%dry solids
Total Poly used	250	L
Active Poly used per tonne of sludge	5.7	L/ton
Skips Sludge Cake Removed	27	skips
Total Volume Sludge Removed	145.0	tonnes
Total TDS Sludge Removed	21.7	tds



INFLUENT ANALYSIS

Date	Day	Flow to Plant (m³/d)	Flow to Plant (m³/h)	Flow to Plant daily flow (m³/d)	Flow to Plant (m³/h)	% Design Flow	BOD mg/l	COD mg/l	BOD kg/d	COD kg/d	TSS kg/d	TKN kg/d	TP kg/d	COD mg/l	BOD mg/l	TSS mg/l	pH	Ammonia mg/l	Total Nitrogen mg/l	Total Phosphorus mg/l	Temperature °C	TSS mg/l	Ammonia mg/l	Total Phosphorus mg/l	Total Coliforms / 100ml	Faecal Coliforms / 100ml
01-Jan-09		4983	906	242.00	5903	76																				
02-Jan-09		6496	920	230.17	6646.17	86	1893	1562	1129.9	1141	1077	160	28	236	170	182.0	7.34	11.7				24.1	4.15	1.96	13	4,600,000	2,400,000
03-Jan-09		5478	577	258.03	6315.03	81																				
04-Jan-09		4507	299	266.74	5072.74	65																				
05-Jan-09		5108	960	247.17	6313.17	81	9966	1124	563.2	1	707			178		112	7.3	10								
06-Jan-09		4998	766	267.58	6020.58	77	7463	1138	569	1	678			189		96	7.3	16.5								
07-Jan-09		5052	642	226.70	5819.7	76	9071	1069	545	1	651			184		110	7.32	21.0								
08-Jan-09		4939	248	249.19	5436.19	70	5417	874	337	1	315	122	12	124		58		13.4				23	2.25	1.55			
09-Jan-09		5571	879	228.36	6879.36	86	11889	1556	701	2	775	142		233	105	118	7.4	16.2				21			10	48,000,000	2,400,000
10-Jan-09		5856	1123	532.67	7111.67	91																				
11-Jan-09		5451	1282	560.08	7293.08	94																				
12-Jan-09		5998	16	473.26	6486.26	83	4725	881	341	1	389			105		60	7.36	15								
13-Jan-09		6523	1504	308.34	8335.34	107	16825	2017	1089	2	1350			242		162	7.3	11.6								
14-Jan-09		4346	751	602.06	5699.06	73	11543	1366	623	1	1174			243		206	7.4	14.2								
15-Jan-09		5815	872	531.17	7018.17	90	94787	11306	5654	1	10692	69	39	1811		1522	7.4	9				10	6.50	3.45			
16-Jan-09		5806	974	577.73	7057.73	91	8940	1729	536	3	974	110		245	76	138	7.3	15.9				16			10	2,400,000	460,000
17-Jan-09		5872	924	584.19	7473.73	96																				
18-Jan-09		5220	909	603.21	6813.19	85																				
19-Jan-09		5836	868	601.84	7107.21	91	7200	1386	463.2	1	540			196		76	7.32	14.5								
20-Jan-09		5858	878	611.29	7135.84	92	12000	1208	469.2	1	1028			168		144	7.34	12.4								
21-Jan-09		5662	868	573.62	6931.29	89	10244	1809	603	1	1206			282		174	7.4	18.1								
22-Jan-09		5836	903	601.29	7312.62	94	6563	1186	385	1	804	104	14	162		110	7.5	14.7				14	1.85	3.10			
23-Jan-09		5895	848	549.67	7344.29	94	7099	996	426	2	588	102		122	68	80	7.53	11.4				14			10	1,100,000	1,100,000,000
24-Jan-09		5207	1336	562.82	7092.57	91																				
25-Jan-09		239	868	620.09	6693.82	86																				
26-Jan-09		5808	384	602.20	6812.09	88	5617	802	351	1	555			91		94	7.4	8.9								
27-Jan-09		6709	1258	602.37	7568.2	97	12170	2172	1252	2	1711			287		220	7.28	13.8								
28-Jan-09		5148	1,049	624.78	6799.37	87	5333	755	278	1	367			111		54	7.0	11.7								
29-Jan-09		6216	1,198	581.62	7939.76	102	12911	1151	776	3	619	118	17	145		78	7.49	13.1				15	2.15	1.30			
30-Jan-09		5443	892	708.99	6816.62	88	4381	477	263	2	318	70		86	38	48		8.6				10.1			10	11,000,000	11,000,000
31-Jan-09		6586	987	660.30	6281.89	107																				
Average		5329.71	857.3548	467.0881	6810.534	87.58402			1700.911	611.2739	2.3404924	1257.541	111.0222	21.89189	246.4286	89.4	121.619	7.3	13.21			16.28889	3.18	2.27	10.6	13020000	3472000

Legend: External Analysis Results — Weekend — Bank Holiday

Monthly Report - Midleton January 2009 - Effluent

EFFLUENT ANALYSIS

Date	Day	Q m3/d	COD mg/l	BOD mg/l	SS mg/l	pH	NH3-N mg/l	NO3 mg/l	NO2 mg/l	TKN mg/l	TON mg/l	TN mg/l	TP mg/l	OP mg/l	OFG mg/l	Salinity mg Cl/l	Trns'm %	Total Coliform /100ml	Faecal Coliform /100ml
01-Jan-09																	90		
02-Jan-09			19.0	3	12	7.4	6.3					5.3	1.00	0.91	10	405	90		
03-Jan-09																	90		
04-Jan-09																	92		
05-Jan-09			29.0		10	7.2	7.2										91		
06-Jan-09			20.00		14	7.1	7.4										87		
07-Jan-09			31		6	7.3	8.2										90		
08-Jan-09			19		8		6.6					8.3	0.32	0.33			91		
09-Jan-09			33	4	24	7.3	5.1					5.2			10	65	92	23	4
10-Jan-09																	91		
11-Jan-09																	91		
12-Jan-09			16		26	7.3	6.5										91		
13-Jan-09			14		10	7.2	5.9										100		
14-Jan-09			33		26	7.3	6.9										87		
15-Jan-09			17		26	7.3	4.4					6.2	0.44	0.40			83		
16-Jan-09			16.4	3	6	7.2	4.7					4.2			10.00	594	81	9	4
17-Jan-09																	84		
18-Jan-09																	86		
19-Jan-09			13		4	7.3	3.5										86		
20-Jan-09			19		4	7.3	2.8										86		
21-Jan-09			20		8	7.3	4.6										85		
22-Jan-09			11		2	7.4	5.0					4.9	0.21	0.2			87		
23-Jan-09			13.5	4	6	7.4	3.1					3.6			10	82	86	43	43
24-Jan-09																	86		
25-Jan-09																	89		
26-Jan-09			7		4	7.4	1.3										90		
27-Jan-09			18		6	7.2	1.3										89		
28-Jan-09			9		6	7.4	1.9										89		
29-Jan-09			13		4	7.4	1.4					15.0	0.40	0.34			89		
30-Jan-09			20.9	4	8		1.40					4.2			10	345	90	43	43
31-Jan-09																	90		
Average			**18.6**	**3.6**	**10.5**	**7.3**	**4.5**				**#DIV/0!**	**6.3**	**0.5**	**0.4**	**10.0**	**298.2**	**88.7**	**29.5**	**23.5**

Legend: Consult_US Weekend EPS

Midleton WWTP
Operational Report - EPS
9

2

M.C. O'Sullivan & Company Ltd.
Innishmore, Ballincollig,
Co. Cork, Ireland.
Telephone: (+353) 021-870200
Fax: (+353) 021-873742
Email: mcoscork@iol.ie

24th November, 1999.

Mr. Jack Matson,
Divisional Engineer,
Cork County Council,
County Hall,
Cork.

Re: *Midleton Main Drainage .*

Dear Sir,

The proposed treatment plant has the capacity to treat a flow of 3 DWF from 15,000 p.e. The treatment is divided into three streams each capable of providing treatment for 5,000 p.e. The contract presently under construction is for the construction of two streams, 10,000 p.e.

In the 1993 Preliminary Report the 1993 population was calculated at 8,341 p.e. Between 1993 and 1998 planning permission for 1300 housing units has been granted and of which 500 units have been constructed. Allowing for the same rate of construction for 1999 and 2000 and assuming an occupancy rate of 4 persons/unit results in an additional 2,800 p.e. requiring treatment. = + 700 houses from 1993 - 2000

Cork County Council has agreed to provide treatment to the effluent from Dawn Meats treatment plant. The E.P.A. discharge license for Dawn Meats plant allows a maximum hourly discharge of 50 m^3/hr with a BOD of 60 mg/l. To ensure that the retention time in the Garryduff Treatment Plant is maintained to ensure full denitrification is achieved the volume of the Dawn Meats plant is the critical factor. During the period May 1998 to April 1999, the daily volume of discharge was of the order of 550 m^3/day. If this volume was delivered to the Garryduff treatment plant over a 24 hour period the hourly volume entering the treatment plant would be 23 m^3/hr, which is equivalent to a population of 594.

the "splendid results" show full denitrification is achieved

As result of the increase in population and the discharge from Dawn Meats, delivered over a 24hr period, on commissioning the treatment plant will be required to provide treatment for: -

1993 population equivalent	= 8,341
1994 to 2000 increase in population	= 2,800
Population equivalent form discharge from Dawn Meats	= 594
Total population equivalent	=11,735

594/11,141 = 5%

= 150 houses (5%)

M.C. O'SULLIVAN
Consulting • Engineers

Mr. Jack Matson, Cork County Council

24th November, 1999.

Therefore, the third stream at the Garryduff Treatment Plant is required immediately. I would recommend that the construction of the third stream should be constructed as an extension to John Fleming Construction Ltd.'s contract for the following reasons: -

- The rates in the present contract for this work are extremely competitive and the construction costs of the extra stream would be IR£610,000 (incl. VAT) approximately. If the third stream was to be constructed as a separate contract, starting when the present contract is completed, the corresponding rates would in all probability be significantly higher.

- A second contractor could not enter the site until the present contract is completed. Therefore, the only way of providing adequate treatment capacity in 2000 is to construct the third stream as an extension to John Fleming Construction Ltd.'s contract.

- It must be borne in mind that if the plant was overloaded by 20% or more there would be danger of not complying with the Department of Fisheries discharge licence.

Assuming that from the year 2000 onwards the annual rate of house construction remains at that experienced from 1994 to 1998 the treatment plant at Garryduff, with the three streams constructed (15,000 p.e.), would have adequate capacity until 2007. It should be noted that in the last two years approximately the rate of planning applications for Midleton has increased substantially, as has the size of the proposed developments with one application for 700 houses alone. Therefor, the likely rate of house construction in Midleton will be significantly greater than that experienced to date. The review of the Development Plan for Midleton currently being carried by Cork County Council, in relation to the allowable densities on currently zoned land and the zoning of additional lands for housing, should also examine the impacts on the Garryduff treatment plant.

If you have any queries please contact me.

Yours sincerely

Liam Singleton

LIAM SINGLETON.

LS/DOD.

Our Ref:N:\Workdirs\033(Cork CoCo S)\037(Midleton SS)\LETTERS\LS 24-11-99.doc

V.A.T. No. IE6561581I

BARRY & PARTNERS

EPS – Pumping and Treatment Systems
Head Office
Mallow
Cork

J. B. Barry & Partners Ltd,
Consulting Engineers,
Technology House,
Wallingstown,
Little Island,
Co. Cork,
Ireland

Attn: Barry O'Toole

Date: *27th March 2006*
Ref.: *Y5335/2.0/574/RJK*

RE: MIDLETON, KILLEAGH, CASTLEMARTYR, CLOYNE OPERATE AND MAINTENANCE CONTRACT
Additional Information No 4

Dear Barry,

With reference to the above Contract JB Barry & Partners confirm that the Current Treatment Capacities have been agreed with all parties and shall be set as the following:-

Midleton WWTP	Unit		
Design Dry Weather Flow	l/s	30	2592 m³/d
Maximum Instantaneous Flow	l/s	90	7776 m³/d
Maximum Duration of Instantaneous Flow	Hours	0.5	say every 3 hours
Maximum Daily Flow Volume	m^3/day	3248*	18 hours HRT
Maximum BOD Load	Kg/day	1200	
Cloyne WWTP	Unit		
Design Dry Weather Flow	l/s	2.6	
Maximum Instantaneous Flow	l/s	7.8	
Maximum Duration of Instantaneous Flow	Hours	0.5	say every 3 hours
Maximum Daily Flow Volume	m^3/day	300	18 hours HRT
Maximum BOD Load	Kg/day	84	Design
Castlemartyr WWTP	Unit		
Design Dry Weather Flow	l/s	4.63	
Maximum Instantaneous Flow	l/s	13.89	
Maximum Duration of Instantaneous Flow	Hours	8	
Maximum Daily Flow Volume	m^3/day	400	
Maximum BOD Load	Kg/day	120	
Kileagh WWTP	Unit		
Design Dry Weather Flow	l/s	2.31	
Maximum Instantaneous Flow	l/s	7l/s**	
Maximum Duration of Instantaneous Flow	Hours	0.25	
Maximum Daily Volume	m^3/day	200	
Maximum BOD Load	Kg/day	60	

J B B... Partners Ltd., Technology House, Wallingstown, Little Island, Co. Cork Tel: 021 452 0220 Fax: 021 452 4473

BARRY
& PARTNERS

3732 m³/d.

Note

*:- The total maximum flow to Midleton is set at 1.44DWF currently the plant receives daily flow in excess of this figure. Therefore the Service Provider is to undertake his best endeavors to keep the plant within its consent limits when the daily flow exceeds this maximum figure.
**:- The maximum instantaneous flow to Killeagh is to be set at 7l/s currently the pumps are rated at 12-14l/s. These pumps shall be down rated to 7l/s using the Capital Replacement Fund allowances.

Pages 52, 53, 57, 58, 60, 75, 76, 80, 81, 83 of Volume 1 and pages 14, 15, 17, 19, 21, 38, 42, 45, 48 of Volume 2 have been amended to incorporate the above Treatment Capacities.

There also have been a number of additional tender queries and requests. Please find below a list of the tender queries raised and our responses: -

Contract Clarifications:-

1) Please forward pump design duty points for the main pumping stations?

This information was requested from Cork County Council but has not been received. The only data JB Barry & Partners have is the pump curve for the onsite pumping station at Killeagh WWTP, which is included within the attachments.

2) Please advise if the Contractor is being asked to provide additional sludge pumping to serve the new centrifuge at Midleton?

The new centrifuge will be served from the existing sludge pumps. If additional pumps / uprating of the existing pumps is required in future then this will be undertaken using the allowances in the Capital Replacement Fund.

3) Can you please confirm that the Service Provider is being asked to undertake to treat up to 1,200kg of BOD per day on an on-going, continuous basis in the existing WWTP at Midleton and guarantee to meet the discharge consent for this plant?

The BOD load has been amended to 900Kg BOD a day in line with the Environment Impact Statement. Volumes 1 & 2 have been amended accordingly as stated above.

is it for 15,000PE with 3 streams 10,000PE is 2 streams?

4) The specification requires that the loose –leaf copy of the schedule and form of tender is completed and returned. We did not receive a loose-leaf copy of the schedules and form of tender. Please re-issue the pricing schedules with the revisions agreed at the Pre-tender meeting?

A copy of the schedule and form of tender in loose form is included within the attached as requested.

J B Barry & Partners Ltd., Tech Hub, House, Wallingstown, Little Island, Co. Cork Tel: 021 452 0220 Fax: 021 452 4419

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Contract Amendments:-

1) Please advise if the sludge reception unit to be installed in Midleton must incorporate a screen capability. If so what size are particles to be screened to? Also is the Contractor to provide a sump to receive the imported sludge before pumping to the holding tank?

A 5mm screening facility is to be provided at the Midleton plant together with a sump and pumps to pump into the holding tank. Pages 63 and 86 of Volume 1 have been amended to include these additional items of plant that are required.

Yours sincerely,

Richard Kent
ON BEHALF OF
J. B. BARRY & PARTNERS LIMITED

Encl:-

Volume 1 revision of the following pages – 52, 53, 57, 58, 60, 63, 75, 76, 80, 81, 83, 86

Volume 2 revision of the following pages – 14, 15, 17, 19, 21, 38, 42, 45, 48

Copy of Form of Tender – Pages 13 – 18 of Volume 1

Copy of pricing schedules – Pages 52 – 97 of Volume 1

Pump curve of Killeagh WWTP onsite pumping station

J B Barry & Partners Ltd., Technology House, Wallingstown, Little Island, Co. Cork Tel: 021 452 0220 Fax: 021 452 4419

Comparison of the faecal coliform content of the storm overflow tanks pumped to the river with the sewage pumped to the WWTP for treatment.

Days when f.c. concs. were greater in the storm tanks than in the influent to the WWTP.

	B1 + B2	Influent to WWTP		Storm Tank
Date	Storm overflow	Volume	Influent	at Bailick 1
	volumes (m3)	cu.m./day	f.c./100ml	f.c./100ml
	manual logs	(EPS reports)		
	next a.m.			
19.05.05	1,089	6,590	5,200,000	100,000
26.05.05		7,566	5,840,000	6,240,000
02.06.05		6,173	1,040,000	1,000
20.10.05	6,246	7,299	8,400,000	2,000,000
27.10.05	1,710	7,341	15,600,000	80,000
03.11.05	11,081	7,496	9,600,000	1,800,000
10.11.05	2,369	7,445	2,900,000	5,800,000
17.11.05	1,694	7,363	3,300,000	4,800,000
24.11.05	14	7,194	1,900,000	1,200,000
01.12.05	5,155	5,671	2,000,000	170,000
05.01.06	1,184	6,039	3,400,000	9,400,000
12.01.06	1,134	6,422	2,600,000	4,800,000
27.03.06	952	8,139	1,800,000	96,000
06.04.06	79	7,151	3,700,000	80,000
10.04.06		7,054	9,200,000	130,000
20.04.06	945	7,076	19,000,000	450,000
24.04.06		7,178	2,200,000	1,200,000
08.05.06		7,010	2,600,000	1,000,000
25.05.06	212	7,905	not reliable	8,000
16.08.06	772	3,651	40,000,000	2,400,000
23.08.06	812	3,609	6,200,000	1,200,000
31.08.06	90	5,679	25,000,000	1,400,000
26.10.06	13,155	8,211	4,600,000	400,000
31.10.06	391	7,843	7,700,000	2,000,000
09.11.06	533	6,787	4,400,000	1,600,000
16.11.06	4,250	6,963	3,300,000	880,000
23.11.06	3,854	6,638	640,000	2,120,000
01.12.06	7,821	8,171	210,000	46,000
08.12.06	4,484	9,094	530,000	1,600,000
11.12.06	2,887	8,606	792,000	730,000
19.12.06	1,715	8,548	440,000	2,000,000
05.01.07	2,754	8,255	4,600,000	2,000,000
10.01.07	1,769	8,003	2,300,000	1,100,000
15.01.07	1,962	8,409	3,200,000	200,000
25.01.07	277	8,049	2,600,000	1,400,000
30.01.07	295	7,614	6,600,000	1,600,000
09.02.07	1,609	8,192	4,700,000	3,120,000
12.02.07	576	7,344	2,400,000	4,800,000
22.02.07	5,184	7,352	340,000	390,000
28.02.07	2,041	7,608	2,800,000	1,000,000
05.03.07	10,876	7,865	19,000,000	12,000,000
15.03.07	482	8,117	4,200,000	8,800,000
20.03.07	619	7,743	2,800,000	10,000
30.03.07	40	7,685	3,800,000	10,000
02.04.07	562	6,624	29,000,000	100
13.04.07	356	6,295	10,000	5,600,000
15.06.07	1,008	6,075	6,400,000	11,000,000

21.06.07	1,906	5,535	10,000,000	1,000,000
13.07.07	4,253	6,732	3,300,000	1,000,000
19.07.07	0	6,375	16,000,000	2,400,000
10.08.07	376	6,389	3,400,000	1,400,000
13.08.07	875	4,939	100,000	2,900,000
04.01.08	3,618	4,611	7,000,000	4,000,000
11.01.08	4,797	4,519	520,000	1,800,000
18.01.08	3,101	6,769	1,000,000	20,000,000
25.01.08	1,697	7,945	2,100,000	1,500,000
01.02.08	119	3,528	2,500,000	1,000,000
08.02.08	356	3,384	100,000	100,000
25.03.08	0	7,066	8,800,000	900,000
01.08.08	4,059		11,000,000	34,000,000
08.08.08	396		16,000,000	4,800,000
15.08.08	1,960		14,000,000	1,700,000
22.08.08	3,512		1,000,000	1,000,000
29.08.08	990		4,800,000	3,000,000

These comparative figures were discontinued from September 2008

Ballinacurra unaccounted-for "excess" flow from the Midleton sewerage system.

Year by year analysis of the average dailys flows throughout the sewerage system - expressed as m3/day

A Year	B Industrial flow	C Max. treated WWTP flow	D Expected total flow to Ballinacurra 1	E Actual flow Ballinacurra 1 to Rathcoursey	F Unaccounted-for excess flow (untreated) E-D	G Total storm overflow	H Total daily flow to the sea E+G	I Total daily flow of Midleton domestic sewage C+F+G
2002	2,316	6,687	9,003	12,273	**3,270**	913	13,186	**10,870**
2003	1,607	6,371	7,978	11,047	**3,069**	323	11,370	**9,763**
2004	1,548	6,137	7,685	10,599	**2,914**	510	11,109	**9,561**
2005	1,632	5,976	7,608	10,903	**3,295**	861	11,764	**10,132**
2006	1,989	6,177	8,166	11,738	**3,572**	1,082**	12,820	**10,831**
2007	2,044	5,999*	8,043	11,605	**3,562**	760**	12,365	**10,321**

*Note progressive drop in influent vol. despite the rapid growth of the town.

**Storm tanks were left full more and more from 2006, which would permit gravity overflows in addition.

Note that the design Dry Weather Flow (DWF) for this plant is 2,350 m3/day.
Thus average flow is 4 DWF.
The highest daily flows of domestic effluent can reach 30,000m3/day (13 DWF)