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Environmental Licensing Programme,
Office of Climate, Licensing and Resource Use,
Environmental Protection Agency,
P.O.Box 3000,
Johnstown Castle Estate,
Co. Wexford,
Ireland.

28th March 2008

Dear Sirs,

Application by Cork County Council for a Waste Water Discharge Licence for Midleton WWTP.

We are grateful for the chance to be able to raise with you our belief that the Midleton WWTP is, at present, not fit for purpose and that, in such circumstances, neither its primary discharge, nor the discharges from the various storm tanks and pumping stations should be licensed. Nor do we believe that the quality of the effluent can ever be made reliable enough to warrant its primary discharge in such close proximity to oyster beds, which, for many years have had a substantial enough production to feed one million people p.a. with half a dozen oysters.

The discharges are into an area designated an SAC and an SPA and one which should have been designated as a Shellfish Water in 1981 – at which time it provided about a third of the value of oysters produced in Ireland, with a workforce that rose eventually to 20. The production of oysters in the North Channel has been more than doubled since, with the output of Fota Oyster Farm Ltd.

From the start of oyster farming in 1970, until December 1988, when the sewage from Midleton was brought down from the town to an outfall at Rathcoursey Point, to be discharged comminuted, but otherwise untreated, some 5km closer to the beds and about 1km from the oysters, we suffered no health problems with our produce, which was sold direct to restaurants and wholesalers, mainly on the Continent and in London. After December 1988, we were alerted to literally hundreds of people reporting ill after eating oysters from Cork Harbour. As you are surely aware, the Department of Marine, in accordance with their first foreshore licence, required, in March 1992, that the County Council put in a Secondary Treatment Plant with UV disinfection "as a priority item".

The present plant is a result of this and a High Court action to bring forward its construction from December 2005, which the County Council had felt complied sufficiently with the requirement under the UWWTD, to 30th June 2000.

The oysters in the fishery have been tested since 1995 for the Norwalk-like virus (now renamed norovirus) that causes the sickness and diarrhoea, which is passed on by shellfish, but, apart from one 7-month period, since the new plant was brought into being, they have been continuously contaminated. Finally, in October 2002, following a further 150 people reported ill, including an outbreak of illness caused by our oysters in Hong Kong, the FSAI required that the fishery should be closed down until such time as the water could be pronounced safe for direct sales.

Norovirus (often called the winter vomiting bug) arises only from human sewage. Recent studies, such as that carried out by the Marine Institute as part of the EU "Redrisk" project in Clew Bay, have shown that norovirus contamination is especially prevalent in winter and occurs when untreated sewage, especially the result of storm overflows, is released in the close proximity of shellfish.

I am proposing to lodge this submission in two, attached parts, with one separate appendix. The first provides our comments on the flows, loads and overflows detailed in the application, which I hope will provide you with an understanding of what this plant really has to cope with. For the second, I am indebted for technical comment on the design and capacity of the WWTP to Mr. C.J. Mulready, formerly Visiting Professor at the University of Leeds, Chartered Engineer, Chartered Scientist, Chief Executive Public Services, Jersey and responsible for installing Europe's first UV tertiary treatment plant (British Airways Scientific Prize 1994); Regional Engineer Wessex Water, and, incidentally, asked over to Dublin by Mr. Louis Kilmartin, DOE, to advise on sludge treatment and, in further discussion, the preparation of the new environmental legislation, based on the Jersey model, which he had developed.

Our overarching dissatisfaction with the Midleton WWTP and the picture of it that is painted in the application for the WWD Licence, that you have received, is summed up succinctly in the careful wording of the statement, given, more or less word for word, to your Audit team on 6th December 2006 and put forward at the bottom of p.3, *"The treatment plant treats all flows that arrive at the works (3DWF) to tertiary treatment standards (UV disinfection)."* All that we, and yourselves, require, is simply that "the sewage of Midleton is treated". We will show you that the flows and loads in the Midleton sewerage system are far in excess of what has been outlined to you in this application and, I hope, we will also demonstrate to you with worked calculations, that the plant cannot cope even with its 1993 design capacity, let alone after experiencing the fastest growth of any satellite town in the south of Ireland over the last 14 years. We will show you that the Consulting Engineers, who designed the plant, actually wrote to the County Council in 1999, even before the plant was finished, to say that it needed to be extended urgently and that overloading by 20 % could cause it to fail the Department of Fisheries' foreshore licence.

We now also have the minuted views of Mr. Noel O'Keeffe, Acting Cork County Engineer, agreeing that, *"overflow incidents* (are) *more defensible than inadequate treatment or plant downtime."* Plant down-time would only arise through the organic overloading of the plant, when the insufficiency of oxygen would allow anoxic conditions to arise, leading to septic conditions taking over. It is the belief of Mr. Mulready, that to prevent the collapse of the activated sludge, the BOD loads entering the plant have had to be more and more severely curtailed, leading to the present ridiculous situation, where loads are now often only a fraction of the 1993 design load. In the full year to 31st October 2007, 35% of the daily loads entering the plant, during the 6 winter months, were less than 6,000 PE (the 1993 design loading was for 10,000PE). The strategy of keeping this plant in operation would seem to be one of finding new ways of shedding load to the environment. As the whole point of the exercise is not to treat the load, it will be reaching the estuary untreated and, as far as human health is concerned, with its pathogen load intact.

In terms of the hydraulic load, we will show you that Mr. Tom Ruddy, Technical Director of the Plant Operator, EPS, for 28 years, is minuted as saying that, *"sustained flows of over 90 l/s* (equivalent to 7,776 m3/d or c.3 DWF) *(greater than 8 hours) will wash out mixed liquor and cause failures of treatment standards."* Over the last full year to 31st October 2007 there has only been one single day when the flow in the Midleton sewerage system has been less than this warning level of his. The County Council and Plant Operator seem now to have agreed upon a value of M.C.O'Sullivan's design DWF of 2,256 m3/day and using this figure, there have even been 107 days in this period when the recorded flow has been **double** Mr. Ruddy's figure, i.e 6 DWF, and 18 days when it has been even over 10 DWF. There were 6 days when the flow was over 30,000 m3/day, with the maximum being 35,801 m3/day (15 DWF) on 3rd December 2006. On top of this, we will show you that there have been very substantial unrecorded, gravity flows out of the system, especially from the Bailick 1 storm tank.

Of the utmost importance to the environmental state of the Shellfish Water of the North Channel oyster fisheries, is the proximity of the primary discharge point at Rathcoursey Point. We shall show you that there are just too many occasions of observed sludge overflows and high faecal coliform counts, to offer the necessary guarantee of reliability of the treatment and disinfection process that a discharge in such close proximity to oyster beds demands. Furthermore, by bringing this outfall point 5km closer to the oyster beds in 1988, the County Council were in contravention of Article 8 of the Shellfish Waters Directive (79/923/EEC), *"Implementation of the measures taken pursuant to the Directive may on no account lead, either directly or indirectly, to increased pollution of coastal or brackish waters"*, which, as clarified by the rulings of the European Court of Justice on 14th June 2007 (Case C-148/05) and that against Italy (Case C-225/96 Commission v Italy (1997) ECR I-6887), should have been transposed into Irish law in 1981, making the increased pollution of the *de facto* Shellfish Water since then an illegal act, which we trust may not now be licensed.

Both I and Mr. Mulready would be happy to answer any questions, or provide any more factual data that you may require and, indeed, would be happy to come to see you about our concerns.

Yours sincerely,

D.Ll.Hugh-Jones.

Copy, with submissions, to DG Environment, Brussels.

Submission of Objection to the

Application by Cork County Council for

Waste Water Discharge Licences

for the discharges from

Midleton WWTP, Co. Cork;

for the Current Storm Overflow Arrangements and

the Location of the Primary Discharge at Rathcoursey Point.

submitted by

D. Ll. Hugh-Jones, M.A., Dip. Agric. (Cantab.), M.M.B.A., F.R.G.S.,

Atlantic Shellfish Ltd., Rossmore, Carrigtwohill, Co.Cork

and

C. J. Mulready, M.Sc., C.Eng., C.Sci., F.I.Chem.E., F.I.W.E.M., M.I.Mech.E.,
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Introduction

We propose to present our comments on a page-by-page basis, so that they can be read directly alongside the County Council's Application. Although the amount of detail presented here is, unavoidably, considerable, we did not feel an executive summary would serve any real purpose. In the same way, although an index could be helpful to the layman, we hope, that by referring to the structure of your Application Form, it will not be of any extra benefit to yourselves and we have dispensed with one.

As discussion is needed on the two most important aspects of the overloading of this plant on the very first page, we intend to deal with them straight away at some length and add further detail under the relevant headings, as they come up, later in the Application.

p.3 line 21.

"The influent flow to Midleton WWTP ranges from between 2DWF (Dry Weather Flow) and 3DWF even during dry weather periods. Typical influent flow to the plant is 60 -100% of the design flow."

The hydraulic load.

As you must surely know, the above statement is a fundamental misconception, that is both wrong and misleading and is repeated in every Monthly Report, where, on the Influent Analysis page, the influent volume, Q, is expressed as a % of the "Design Flow" and that is taken as **3 DWF**. The capacity of a WWTP is based on the design DWF, with the in-built capacity to accept up to 3DWF for **short periods of time**. Accepted WWTP design would often size the plant to be capable of handling an average of 1.3DWF. In the case of Midleton, when the operation of the plant was put out to tender in 2006, the applicants were told by the consulting engineers, employed by the County Council, that the Current Treatment Capacity (CTC) for Midleton was 125 l/s (10,800m3/day) or 4.8 DWF @ 1 DWF being 2256m3/day (Tender documents Vol.1 Schedule 3.5). When this was queried by the 3 potential operators, the County Council's consulting engineers attempted to get acceptance for a slightly lower 4.6 DWF, saying, *"The maximum flow received to the plant is 119 l/s whilst still achieving its final effluent quality the CTC has been amended to this figure..... It should be noted that the CTC will be continually assessed by the Liaison Monitoring Committee throughout the 10 year operating period and if it is deemed too onerous on the Service Provider then it will be reviewed and amended accordingly"* (letter from J.B.Barry and Partners of 16th February 2006.Item 49.**(1)**)

In the event, the County Council could not find an operator prepared to accept a maximum daily flow into the plant of greater than **3,248 m3/day or 1.44 DWF** (setting the DWF at the figure given to us originally by M.C.O'Sullivan as 2,256 m3/day), with the added stipulation that the maximum duration of instantaneous flow of 3 DWF should not be for more than 0.5

hours in every 3 hours. This is confirmed in the letter from J.B.Barry and Partners of 27th March 2006 **(2)**, where the following amazing statement is then made at the top of p.2, "*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 endeavours to keep the plant within its consent limits when the daily flow exceeds this maximum figure.***" This is clearly of little comfort to us, operating in a shellfish water, requiring the highest levels of treatment all the time and where the public's health is our responsibility – and we trust that you will also find it an unacceptable abrogation of responsibility by the County Council – as well as the complete removal of all accountability from the Plant Operator.

The only time that the flow to the WWTP has ever been lower than this 3,248 m3/day maximum acceptable flow to the Plant Operators, in its 7½ years of operation, was when the aeration streams were shut down and re-seeded with activated sludge in August 2006. The average flow put through the plant from when we were first given the full figures on 2nd November 2001 to 31st October 2007, has been 6,237m3/day – approximately **double** the flow figure that appears to now be acceptable to the operators tendering to run the plant and to the chosen operator, EPS Ltd.

As well as insisting that the maximum daily flow to the plant, for which they could be held to be responsible, should not exceed 3,248 m3/day, Mr. Tom Ruddy, Technical Director of the Plant Operator, EPS Ltd., is also minuted on 6th March 2006 **(3)** p.2 line 24, as warning the County Council that, "*sustained flows over 90 l/s* (i.e.7,776 m3/day) *(greater than 8 hours) will wash out mixed liquor and cause failures of treatment standards.*". We have often requested the instantaneous flows to the plant, but these have not been given to us, until extremely recently. We would expect the daytime flow to be 1.25 -1.5 times the night-time flow, if Midleton follows the usual domestic sewage flow pattern, but even using the average flow over the full day, there have only been 17 days in the whole of the last full year to 31st October 2007, when the (recorded) flow in the Midleton domestic sewerage system (Bailick 1 & 2 plus storm overflows) has been less than 90 l/s.

Much of the excess hydraulic flow is shed through 1) the Bailick 1 & 2 storm pumps (see details under consideration of p.21 Attachment B.10 p.1 line 9); 2) by unrecorded gravity flow from Bailick 1 storm overflow tank (see 4 paras. below) and 3) by overflows from Ballinacurra 2 and Bailick 2 overflows to Ballinacurra 1 final pumping station (see details under consideration of Application p.38, Attachments D.1 SWO 4 & 5). The remaining flow to the WWTP is restricted to 75 l/s from Bailick 1 and 15 l/s from Bailick 2, or, in fact, set at the 90 l/s "danger" level that Mr. Ruddy warns of above. Despite these losses of load prior to reaching the plant, the average daily flows actually received into the plant were still often in excess of the 8-hour danger level he quotes. In the 6 months over last winter (October 2006 – March 2007), daily flows of over the 7,776 m3/day level were received into the plant on:

1) "Recorded" flows of domestic sewage from Bailick 1 & 2 pumping stations greater than 90 l/sec (7,776 m3/day) :

October 2006	5 occasions
November	3 occasions
December	23 occasions
January 2007	21 occasions
February	3 occasions
March	13 occasions

In this 6-month period, the total "recorded" hydraulic flow in the Midleton sewerage system was actually over 6 DWF on 107 days; over 10 DWF on 18 days and even rose to 15 DWF (35,801 m3) on one day. The volume contributed by Irish Distillers Ltd., which flows down the industrial sewer directly to Ballinacurra 1 pumphouse, is capped at the relatively small volume of 750 m3/day. There are no other sources of industrial effluent into the industrial sewer, thus, with the proviso that up to 750 m3/day may come from IDL, the rest of the sewerage flow is domestic and its faecal content can be seen from the County Council's bacteriological testing around the system and, in particular, that of the industrial sewer **(4)**. Thus, in terms of assessing the recorded volume of domestic sewage in Midleton at present, I believe the left hand column below gives the best picture (although it will include up to 750 m3/d IDL treated waste), as it also includes the unaccounted for excess flow out of Ballinacurra 1 pumping station, that we are told includes overflows of domestic sewage from Bailick 2 and Ballinacurra 2 - see section 3) in this para. below and also **(31)**. However, I have subtracted the total industrial flow through Bailick 1 to arrive at the figures in the column on the right for "recorded" **domestic** sewage flows. It can be seen that, even then, domestic sewage flows of 5-10 DWF are commonplace. These cannot be treated by the Midleton WWTP and must result in untreated sewage being discharged to the estuary – see Mr. Mulready, our consulting engineer's report. The breakdown of these larger loads over the 6 months last winter (October to March) was :

Size of daily flow (m3/day)	No. of times last winter that **total** sewerage flows of this size occurred in Midleton (i.e. incl. the storm overflows in the town).	No. of times last winter that the same total sewerage **less the industrial flow** occurred in Midleton.
>12,000	10	21
>13,000	25	26
>14,000	24	22
>15,000	25	23
>16,000	24	6
>17,000	17	5
>18,000	19	3
>19,000	4	2
20,000-25,000	12	11
25,000-30,000	8	3
>30,000	5	1

The danger of contamination of the estuary through the excessive hydraulic load that is imposed on the Midleton plant, resulting in the "wash-out" of mixed liquor predicted by Mr. Ruddy, can be seen in the frequent crashes in transmission measured at the UV plant. This is dealt with under consideration of p.16 B.3.

2) Unrecorded gravity flows from the Bailick 1 storm overflow tanks.

Prof. O'Kane, in his Hydrodynamic Study of the norovirus problem of the North Channel, which is included with the County Council's Application for the WWDL, describes the operation of the Bailick 1 & 2 storm overflow tanks in Section 4.4 and, in photographs on pp. 104, 106 and 107, shows how high the water level sometimes gets in the Bailick 1 storm overflow holding tanks – far over the level of the gravity openings to the river. At this level we calculate the flow out of these 4 x 600mm gravity overflow openings to the river would be 1,800 m3/hr. The flow diagram of the Tideflex non-return valves, which are used on these 600mm pipes is enclosed **(5)**. I also enclose details of the heights of the storm cells for the 6 months over last winter **(6)**, from which you can see that they were left full all the time – which would allow gravity flow through the storm tanks to occur. When this happened, **flow would not have been recorded via the storm pump hours**, which only give the volumes of the **pumped** overflows to the river.

The total storm overflow from Bailick 1 storm tank for the period 1st January – 31st October 2006 is given in attachment D.1 as 994,594 m3 over 117 days. The pumped overflows totalled 180,455 m3, thus it would appear that the overflows by gravity were 814,139 m3 or 6,968 m3/day. This would make them over 4 times the size of the pumped storm overflows.

Total sewerage flows, including the gravity flows from the Bailick 1 storm tanks

The total sewerage flow in Midleton is the sum of the discharges given by the County Council in Tables D.1

SW01 MIDL	Table D.1(i)(a)	Rathcoursey Point	3,646,225 m3
SW03 MIDL	Table D.1(iii)(a)	Bailick 1 Storm Overflow	994,594 m3
SW04 MIDL	Table D.1(iv)(a)	Bailick No. 2 Storm Overflow	82,900 m3
Total flow through the Midleton sewerage system			4,723,719 m3
Average flow per day over 304 days (1st Jan. – 31st Oct. 2007)			15,539 m3

It would thus appear that the storm overflows of untreated sewage, totalling 1,077,494 m3, account for 22.8% of the total sewerage flow from Midleton.

3) Overflows from Ballinacurra 2 and Bailick 2 pumping stations to Ballinacurra 1 pumping station.

These will be discussed again under consideration of Application p.38, Attachments D.1 SWO 4 & 5, but we have long known that the total flow out of the final pumping station,

Ballinacurra 1, exceeds the two flows it should receive from 1) the WWTP and 2) the industrial sewer. For the period the County Council are considering, this excess flow totalled 1,082,170 m3, or, on average 3,560 m3/day. If this flow comes from overflows from the Ballinacurra 2 and Bailick 2 tanks, as we have been told in the document for the tendering plant operators **(31),** then this further flow of untreated sewage should be subtracted from the Rathcoursey discharge of the treated and industrial flows and the table above becomes:

			Untreated sewage
SW01 MIDL	Table D.1(i)(a)	Rathcoursey Point : treated 2,564,055 m3	plus **1,082,170 m3**
SW03 MIDL	Table D.1(iii)(a)	Bailick 1 Storm Overflow	**994,594 m3**
SW04 MIDL	Table D.1(iv)(a)	Bailick No. 2 Storm Overflow	**82,900 m3**
		thus total untreated flow is :	**2,159,664 m3**

out of the total flow through the Midleton sewerage system of 4,723,719 m3

The average flow of untreated sewage to the estuary over this 304 day period is thus 7,104 m3/day and the percentage of untreated sewage in the discharges from the town sewerage system rises to **45.7%.** This is about four times the size of the hydraulic surplus problem admitted to by the County Council.

Total domestic sewerage flows, including the gravity flows from the Bailick 1 storm tanks – but taking off the industrial sewer flow entirely.

Over this 304 day period the total industrial flow from Bailick 1 pumphouse was 673,745 m3
Taking this from the total sewerage flow, the total purely domestic flow was 4,049,974 m3
Average flow of domestic sewage per day over the period was 13,322 m3

This is still 5.9 times the DWF, which was used to design the WWTP, and so even twice the exaggerated and erroneously stated "design flow" (of 3 DWF) given in the statement that we set out to discuss on p.3 line 21, at the start of this section.

The Midleton sewerage treatment system is clearly hydraulically grossly overloaded. As well as the physical effect of wash-out, referred to by Mr. Ruddy, this has enormous biological consequences in reducing the retention time available for the bacteria to break down the organic load and even in the composition of the bacterial flora, affecting greatly the way the plant performs.

p.3 line 29

"The treatment plant treats all flows that arrive at the works (3DWF) to tertiary treatment standards (UV disinfection.)"

The organic and pathogen loads.

This is not the same statement as, "the treatment plant treats Midleton's sewage", which is all that is required.

Certification of treatment by the Plant Operator

On 8th July 2004 you wrote to Cork County Council recommending 1) upgrading of the plant, 2) optimising its operation and 3) randomising the sampling regime. We then wrote to yourselves on the 16th July 2004, which you will have undoubtedly passed on to the County Council, *"There is one further point that strikes us, which is the question of trust that we need to place in the Plant Operator's Reports. The Operator has to be trusted to report wholly and truthfully what is going on, otherwise, in a case like ours, with a discharge to shellfish waters, people could be made ill – and, unfortunately, many people have been made ill.*

"I think that you are in some agreement with my consulting engineer that the plant cannot treat some of the loads that are reported to be arriving. He regards the plant as being totally inadequate in every area, with no possibility that it can be producing the quite excellent results that are quoted by the Operator (EPS) every month and he feels that it is dangerously misleading to all of us that each report should be signed off, "However, the plant achieved compliance with EU Directive and Irish Regulations." The effluent just cannot be meeting these standards."

That month and for the next two, no statement of certification was made in the Monthly Report by the Plant Operator. It was then altered to the wording, which has persisted to this day, "*Analysing the External analysis results, the Wastewater Treatment Plant has met with all relevant standards as per the associated license during the month of ……* " **(7)**

The associated licence referred to is the current foreshore licence issued by the Department of the Marine, of which you have a copy in attachment B.12. This imposes a faecal coliform standard to be met "*at the inspection chamber in the channel downstream of the treatment plant*". This has been taken to be at the end of the UV channel at the exit of the WWTP. It, of course, tells us nothing about the level of treatment of Midleton's sewage discharge to the sea at Rathcoursey Point, which is what affects the environment and the oyster beds in the vicinity. However, the geometric mean of the effluent is required to be 250 f.c./100ml or less; 95% of samples should be less than 1,000f.c./100ml and, *"in the event of a result of over 1,000f.c./100ml. the Licensee shall immediately contact the Department of Marine and Natural resources to agree necessary action."* At a meeting with the County Council in Midleton on 30th April 2001, the DOMNR requested that the Rathcoursey Tank be sampled

for faecal contamination and this re-commenced in June 2001, having abandoned it, after the first 2 disastrous months, when the samples varied between 12,000 and 70,000 f.c./100ml. However, for all the time that we did not have Rathcoursey data, sampling had been carried on in the sump of the final pumping station of Ballinacurra 1, and this is the same water as is then discharged 5km away at Rathcoursey.

Treatment – disinfection of the pathogen load.

I attached the County Council's bacteriological sampling results for the sewerage system **(4)** and you will see that the picture of what is actually discharged to the sea is quite different to the results of the samples taken at the UV unit. I have broken these results down using results from Rathcoursey, where these were available, and the results from the final pumping station, Ballinacurra 1, when they were not.

Summary of bacteriological sampling results (f.c./100ml) from Rathcoursey Point/Ballinacurra 1.

Period	>100,000	>50,000	>25,000	>10,000	>1,000	250-1000	<250
4.7.00-31.10.07	7 (2%)	17 (5%)	22 (7%)	42 (13%)	107 (33%)	56 (17%)	76 (23%)
Last 12 months	1 (2%)	1 (2%)	1 (2%)	2 (4%)	17 (30%)	15 (26%)	15 (26%)

60% of these results of effluent discharged at Rathcoursey were above the maximum level one might have thought the licence meant to allow. This figure has fallen to 39% of samples in the last 12 month period.

Although the results have improved over the first two poor years leading up to the closure of the fishery in October 2002, the important point to grasp is that there are still times when high levels of faecal coliforms and other pathogens are discharged at the Rathcoursey outfall. Looking at the 3 high counts in this last year and multiplying the f.c. concentration by the total volume discharged to get an idea of the total f.c. discharged and knowing that the per capita discharge is something like 2,000 million f.c./day (e.g. Geldreich 1966), one can estimate the equivalence of the 3 discharges as 11,781; 1,309 and 699 people discharging untreated sewage through the outfall pipe at Rathcoursey.

It is the possibility of these sort of results from time to time that makes the siting of the outfall as far away as possible from the user areas the first consideration of the Environment Agency (UK) in the conditions they impose on UV treated effluents **(8)**. The recently completed EU-funded "Redrisk" study of contamination of shellfish impacted by the sewage outfall of Westport in Clew Bay, carried out by the Marine Institute, 2007 **(9)** concludes that, *"the three major factors influencing norovirus contamination were proximity to sewage*

input, season, with winter representing a higher risk, and the influence of untreated sewage inputs as the result of overflows from the WWTP."

We have requested re-locating the outfall point on many occasions and we will devote a section to this later for your consideration before allowing the licencing of the Primary Discharge Point to be at Rathcoursey Point. However, wherever the Agency decides to grant an authorisation for the primary discharge location and the current foreshore licence conditions cease to have effect, as per Regulation 45, we trust that the measurement of faecal coliform, or viral pollution (as may be the case by then) will be required at that outfall point, where the majority of the effluent is discharged to the estuary – i.e. **at the point which affects the receiving environment.**

Treatment of the organic load (BOD)

Advice that the Midleton WWTP was under-capacity was first given to the County Council by the Consulting Engineers, M.C.O'Sullivan, who designed the WWTP, even before the plant had been constructed, on 24th November 1999 **(10)**. *"As a result of the increase in population and the discharge from Dawn Meats* (594 PE) ..... *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 Flemming Construction Ltd.'s contract for the following reasons:-*

(inter alia)

- *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 aeration streams constructed (15,000 p.e.) would have adequate capacity until 2007."

The variation order requested by M.C.O'Sullivan appears to have met with the approval of the Divisional Engineer **(11)** and then the Assistant County Manager, who signed the necessary order for a second contract to construct a third aeration stream, at a cost of £610,000, "to be proceeded with as an addition to the present contract", on 27th January 2000 **(12)**, but then appears not to have been pursued after the request for a Review Report from the DOE **(13)**.

How often has the organic loading passed this level of 20% overloading (i.e. a PE of 12,000 and over), above which M.C.O'Sullivan's warned there could be the risk that the treated effluent would fail to meet the foreshore licence faecal coliform conditions? Using the external laboratory and on-site laboratory data (converting on-site COD's to BOD's at the ratio of 2:1) overloading of the plant to this degree has occurred as in the following table:

Number of BOD loads in excess of these PE's that were received by Midleton WWTP each year (104 days of weekends not included as not sampled).

		Population Equivalent (PE)					
Year		**>12,000**	**>20,000**	**>30,000**	**>40,000**	**>50,000**	**>60,000**
2000	from 01/07/00	31	6	1	0	3	3
2001		71	20	4	1	0	1
2002		70	22	5	2	0	2
2003		117	16	8	1	1	0
2004		106	19	1	2	1	1
2005		21	1	0	0	0	0
2006		62	4	2	0	0	0
2007	to 31/10	75	24	6	0	0	0

On p.20 B.9 of the Application, the County Council are asked for, *"the population equivalent (p.e.) of the agglomeration* ***to be, or being*** *served by the waste water works*", but they only give a figure that is 15 years out of date - for 1993.

Regulation 3 of the Waste Water Discharge Regulations, defines the "population equivalent" load as, "*being calculated on the basis of the maximum average weekly load entering the wastewater works during the year, excluding unusual situations such as those due to heavy rain.*" Maximum average weekly loads over the years for the Midleton WWTP have been as follows :

Date	No. samples	Max. daily rainfall	Max. av. weekly load (PE)
2-8 Oct. 2000	6	9.9 mm	105,502
1-5 Oct. 2001	5	20.9 mm	21,668
11-17 Dec.2001	5	0.1 mm	34,004
7-11 Jan. 2002	4	2.7 mm	23,340
25-30 Mar. 2002	3	3.7 mm	39,244
13-17 Jan. 2003	5	9.7 mm	22,334
17-21 Feb. 2003	5	2.8 mm	27,951
23-27 Jun. 2003	5	4.0 mm	21,650
16-20 Feb. 2004	5	0.0 mm	20,240
8-12 Mar. 2004	5	23.7 mm	22,899
5-9 Apl. 2004	5	2.2 mm	22,122
21-25 May 2007	4	0.0 mm	21,657
28 May -1 Jun 07	5	16.8 mm	24,945
4-8 Jun. 2007	4	0.0 mm	26,754
16-20 Jul. 2007	5	4.6 mm	21,044

On the basis of this definition in the Regulations of the PE load for which a plant needs to be designed, the Midleton plant is under-designed by a factor of 2-3 times, but, **it is important to note that this becomes more and more of an under-estimate, due to the increasing loss of organic load through the rising volume of storm overflows.** As we have seen above, these storm overflows disposed of nearly half of the hydraulic load in the 304 day period that the County Council chose to look at.

We are hardly surprised that the County Council should be reluctant to commit themselves to a current PE figure. Since the Monthly Reports started in January 2002 when the first declared average monthly BOD was 1,520 kg/day (25,333 PE), the declared organic load, using only the external laboratory analyses, has, after July 2003, been kept within the politically correct band varying between 6,000 -12,000 PE, with the latest load figure for October 2007 at 479 kg/day BOD (7,981 PE) still being only 80% of the 1993 design load – some 15 years later – and Midleton twice the size!

Plotting the average daily influent BOD and SS figure taken from the Monthly Reports "Process Statistics" **(14)**, you can see that the picture that emerges is of virtually no increase in load. Adding the figures for BOD inputs converted from the on-site COD figures given to us at the normal ratio of COD:BOD of 2:1 **(15)**, which also take us back to the start of the plant, a completely different pattern emerges. This shows growth from 11,000 PE in July 2000 to 16,000 PE by May 2004, with an increase in load of approximately 12% p.a. From then on the load being taken into the plant dropped and dropped, until a most interesting period was reached between May 2005 and December 2005 when the BOD load was kept below the 450 kg/day, which we believe is the capability of this plant (i.e. 75% of design) – at which point, for the first time, we had 7 months of (virtually) virus-free oysters. After this, despite enormous storm overflow volumes (see considerations under p.21 B.10), the loads have returned to their "politically correct" band and the contamination of the oysters has returned.

The question, of course, that this poses is, if the population and hence influent load has doubled since the start of the plant and yet very often the plant is still accepting only a fraction of its 1993 design load, where is the rest going? It is clearly disappearing in an untreated form, as it has not been through the plant. And how can the daily load in October 2007 of 479 kg BOD/day suddenly be less than half that of the previous month of September 2007 at 1,040 kg BOD/day? These are not sampling errors as the samples are taken over 24 hours etc. and these are the analyses of the external accredited laboratory.

If this surplus load is being shed untreated to the estuary, then it is hardly surprising that the oyster fishery is contaminated. We are advised by the County Council that it is not being taken away for treatment elsewhere.

It would thus seem that the County Council have been aware for a very long time that the treatment plant was inadequate - and it should be said that the rate of house-building in Midleton has far exceeded the rate mentioned in the M.C.O'Sullivan letter above **(10)**.

Our view that Cork County Council have known for a long time of the inadequacy of the Midleton treatment plant is supported by the worrying statement of Mr. Noel O'Keeffe, Acting County Engineer, Cork County Council, when he is minuted at the meeting with the tendering plant operators on 6th March 2006 **(3)** p.2 line 24, as agreeing, *"overflow incidents* (are) *more defensible than inadequate treatment or plant-downtime."* Plant-downtime is not caused by hydraulic overload, but by allowing too much organic load to be broken down, with an inadequate supply of oxygen to prevent the aeration streams turning anoxic and then septic, with the die-off of the activated sludge bacteria, requiring the emptying, cleaning and re-seeding of the tanks and the slow re-establishment of the correct bacterial flora.

The strategy for surviving with this under-capacity plant, as expressed by Mr. Noel O'Keeffe above, would appear to be to lose organic load wherever possible for the two-fold purposes of 1) preventing poor effluent figures revealing inadequate treatment and 2) preventing the streams turning anoxic and septic, with the ensuing plant-downtime. With so much load being lost to the environment anyhow, it does not make very much difference if little load is actually put through the plant. A check on the dissolved oxygen figures in more or less any month in the Aeration Tank Check List (about p.18 in the Monthly Reports) gives this strategy away. You will find frequent DO levels of 4-5 mg/l – far over the levels required (2.0; 1.2 and 0.8 mg/l in tanks 2, 3 and 4), or even desirable in tanks 4 and 8, which have to be returned to the anoxic, de-nitrification tank. Levels can even be found rising towards oxygen saturation levels of 6-7 mg/l DO and above (e.g. September to December 2005; January, November and December 2006 (June, July probably in error); February, April, October 2007) – where it is hard to imagine that there can be any rotting sewage at all in the tank.

We understand from p.33/34 of the Application that the maximum BOD load, which has been contractually agreed with the current operator is 1200 kg/day (20,000 PE). This is double what the plant was designed to take. An elaborate system of penalties for operator failure are laid out in Volume 1 of the Contract documents, but these are invalidated on p.15 of Volume 2, **(16)** *"The Service Provider will be responsible for producing final effluent to the current consent detailed above up to these incoming flows and loads.* ***Flows and loads in excess of these maximum limits will not be subject to the penalty mechanism*** *however it will be expected that the service Provider will undertake his best endeavours to still comply with the required treated quality standards if these maximum inlet flows and loads are exceeded."*

The system of payments to the Service Provider, as set out in Contract Volumes 1 and 2, is based on the amount of BOD handled. There is thus potentially every incentive for the operator to overload the plant, with the possibility of any penalty being invalidated, because the operator is accepting hydraulic flows over the maximum agreed as acceptable (3,248 m3/day). This state of affairs surely cannot be licensed.

p.4 line 27

"The sludge treatment process consists of:- "

Despite the inclusion of the details of sludge digestion in Sec. F of Appendix 3 (attachment C.1), there is no treatment of sludge at Midleton. It is dewatered and centrifuged and, up till very recently, was taken to landfill (and a willow plantation). This would appear to have been in contravention of the National Sludge Strategy of 1994 and maybe this is why it is now taken for composting.

p.6 line 10

"Currently Cork County Council is advertising for Consulting Engineers to undertake the Design and procurement of the upgrade to 15,000PE."

We have discussed the organic loads being imposed on the plant over the previous 3 pages, but although loads of over 20,000 PE have been received into the plant on 110 occasions; over 30,000 PE on 26 occasions and over 40,000 PE on 18 occasions – the County Council's wish to upgrade the WWTP to cater for a 15,000 PE is not to try to bring up its capacity to deal with the existing loads, but so that a further 1,191 housing units can be added. (Report of J.B.Barry and Partners of June 2006 "Midleton Sewerage Scheme – WWTP Upgrade" p.7).

The inadequacy of this upgrade is surely exposed by the WWTP upgrade required for the village of Carrigtohill, which, though admittedly having plans for expansion to take it up to much the same size as Midleton, or a little bigger, is requiring a plant - **as the first phase - for 45,000 PE?** – and Midleton is still only looking for an upgrade to **15,000 PE**.

p.7 line 7

"The pollution load from these sources varies greatly with daily, weekly and seasonal producers of effluent."

The pollution load varies enormously, but we do not believe that this depends on the producers of effluent. These are now limited to two sources:

1. The local population. It is difficult to think of this varying much from day to day, or, indeed, in Midleton, seasonally.

2. The treated effluent from Irish Distillers. This is limited to a max. of just 750m3/day and, having been treated in the IDL treatment plant, will not add very greatly to the BOD load. Volumes run at between 600-700m3/day on work-days, with only small amounts at weekends.

There are no other load inputs of which we are aware.

We believe that the very great load variations that are experienced by the plant – which, we trust you will agree, are also not conducive to the effective biological functioning of the bacterial flora – are caused by:

1. The cleaning out of the storm overflow holding tanks at Bailick 1 & 2 pumping stations (referred to, from time to time, in the Monthly Reports as the "shock loads" being received into the plant)

2. The diversion of load to the river by use of the storm pumps, especially at Bailick1. For instance in February and March 2007 with storm overflows recorded as 80,202 m3 and 68,022 m3, the average daily BOD loads were 652 kg/day and 517 kg/day, whereas in May and June 2007, when the storm overflows were very much reduced at 6,408 m3 and 18,571 m3, the average daily BOD loads arriving at the WWTP were approximately double at 1,100 kg/day and 1,047 kg/day.

3. The flow-through by gravity of unrecorded overflows from the storm tank at Bailick 1. The photographic evidence in Prof. O'Kane's hydrodynamic study, attached to the County Council's Application, is compelling, showing a high-water mark well above the level of the open 600mm pipes to the river.

As computed above on p.5, the total storm overflow from Bailick 1 storm tank for the period 1st January – 31st October 2006, given in attachment D.1, was 994,594 m3 over 117 days. The pumped overflows totalled 180,455 m3, thus it would appear that the overflows by gravity were 814,139 m3 or 6,968 m3/day. This would make them about 4 times the size of the pumped storm overflows, which over the same period of 117 days averaged 1,542 m3/day.

p.8 line 7 *"As a condition on the granting of the first foreshore licence in 1986, a holding tank was constructed at Rathcoursey so that the discharge would not occur for one hour at low tide."*

The value of holding back the flow of effluent from Midleton for 1 hour at low tide to prevent pollution of the oyster beds in the North Channel can hardly be guessed at, but was put forward by An Foras Forbartha in 1985 to find a way out of the impasse that existed for the Department of Communications, which had responsibility for issuing the foreshore licence, between the Department of Fisheries and Forestry, who knew that discharge of sewage at Rathcoursey spelt disaster for the oyster fishery and the Department of the Environment and Cork County Council.

As far as Mr.O'Sullivan of M.C.O'Sullivans, consulting engineers to the County Council for the Midleton sewerage scheme, was concerned, his opinion was, *"I am more than ever convinced that the tidal tank performs no more useful function than a soother would to a baby and this is of no practical use in the discharge of effluent at Rathcoursey point."* **(17)**

The tidal holding tank has a capacity of 2,120 m3. It is regulated by a "tidal clock" – but we understand that this clock has to be reset manually each week to allow for the changing tidal cycle. We wonder, in passing, why the relatively small expense of a proper lunar clock has been dispensed with all these years, but we realise that actually the continued use of this whole disposal system, after so many years of growth in sewage volume, often makes little difference.

The tidal tank is planned to discharge at HW + ½ hr to HW + 4 hrs to allow the effluent to disperse on the ebb. However, if the flow into the tank is too great and the tank fills completely, the effluent overflows via a high level overflow pipe that connects into the main outfall line downstream of the lunar valve, but upstream of the diffuser across the mouth of East Ferry. The clock then allows the full tank out at HW + ½ hr. I append a table of flow volumes which determine when the tank will be full and I have added the number of times flows of the requisite size happened last winter (October 2006 - March 2007), when overflows were therefore made into an **incoming tide.** To show you the extent of the hydraulic load problem in Midleton, I have added the storm overflow volumes at Bailick 1 & 2, to give you the size of the total sewerage flow in the town during these times of high and potentially, virologically dangerous flow.

These sewerage flows should be looked at in the context that the design DWF of this plant, as stated originally by M.C.O'Sullivan's and accepted in the recent O & M Contract, is 2,256 m3/day and the industrial flow from Irish Distillers is limited to no more than 750 m3/day.

Size of daily flow (m3/day)	Equivalent flow per hour (m3/hour)	Hours at this flow rate required to fill the Rathcoursey holding tank (2,200m3).	Number of times last winter that flows of this size occurred at Rathcoursey Point.	No. of times last winter that **total** sewerage flows of this size occurred in Midleton (i.e. incl. the storm overflows in the town)
>12,000	500	4.4	34	10
>13,000	542	4.1	36	25
>14,000	583	3.8	46	24
>15,000	625	3.5	24	25
>16,000	667	3.3	11	24
>17,000	708	3.1	4	17
>18,000	750	2.9	8	19
>19,000	792	2.8	1	4
20,000-25,000	938	2.3	2	12
25,000-30,000	1,146	1.9		8
>30,000	1,250	1.8		5

If the clock shuts off flow to the estuary at HW+ 4 hrs, then even at a flow of 12,000m3/day, discharge to the estuary will recommence at Rathcoursey at LW+2.4 hrs and there will be 3.6 hours of flood tide to carry the effluent (the **majority** of which we calculate is often untreated- see Mr. Mulready's report attached) in an approximately 75:25 split westwards : eastwards into the North Channel.

I have seen, with my own eyes, brown, river spate-water from Midleton piling up against the out-flowing grey-blue water of the North Channel and flowing on down to the Lower Harbour and then seen this distinct, muddy river water of lower salinity cover the entire oyster fishery right up to Brick Island **in just 2 hours** after the turn of the tide – far less than the 3.6 hours calculated as being available for a 12,000m3 flow above. Furthermore, on an occasion such as this, with a strong river-flow on a falling tide, it is worth realising that raw sewage from the Bailick 1 & 2 storm overflows up in Midleton would have been over the oyster beds in under 6 + 2 hours, well within the timeframe for norovirus to be in suspension and viable.

By the time the flow at Rathcoursey has reached a level of 16,000 m3/day, or over, which it did on 26 days last winter, then the holding tank will be full 1.3 hours after LW and the discharge overflow at Rathcoursey will be available to the transportation potential of virtually the whole of the flood tide. When you appreciate that this happened 26 times in 6 months – or once a week on average – and you remember that it takes 6 weeks for the oysters to be able to cleanse themselves of the norovirus they have taken in, you can see that it is not surprising that their flesh shows up as continually positive. This was, indeed the case, over this last winter period, with all 18 samples taken showing positive for both genogroups of the virus. (In fact, all the 45 samples taken over the whole of 2006 and 2007 have been positive – except for 2. Some of the summer samples, however, were also only positive at a 1 in 3 level)

Thus the use of the Rathcoursey tank, with these larger flows coming down from Midleton, often fails to prevent the discharge reaching the flooding tide, but I would hope the problem of this white elephant (or non-baby-soother) will be subsumed in the more important consideration of removing the outfall from the proximity of the oyster fishery altogether, which we will ask you to consider later.

p.8 2nd paragraph.

"Sampling was carried out due to the granting of the foreshore license to monitor the receiving waters with particular reference to faecal coliform counts. This was conducted due to the existence of extensive oyster farming in the North Channel. Analysis of this data with particular reference to the Bathing Water Directive and the Shellsan Classification System indicated the installation of a secondary treatment plant for the sewage of Midleton would greatly improve the quality of the effluent from the Rathcoursey Outfall and greatly diminish any contribution from that source to the levels of contamination in the receiving waters as a whole."

I think you should know the real history of the problem here. In the early 1980's the County Council asked M.C.O'Sullivan to design a treatment plant for Midleton, sited near the town. This led to his 1981 Report, but he concluded with the words, *"While the brief for this Report specifically calls for a scheme* ***incorporating secondary treatment on land****, I would be failing in my duty as an engineering advisor if I did not point out that aside from monetary considerations the proposals to discharge comminuted sewage at Rathcoursey point for marine treatment is the more reliable form of treatment. In addition, it is superior to land treatment in 9 out of 10 environmental criteria listed on the table on the foregoing page."* **(18)**. This was then the proposal put forward to DOE by the County Council. The Department of Fisheries and Forestry opposed this in a 64pp Submission, highlighting the danger of viral contamination of oysters, for which depuration and surveillance using E.coli as the indicator were both proving inadequate. They also bitterly opposed the siting of the outfall so close to the fishery. The adjudication of AFF has been referred to above, but the foreshore licence of 5th March 1986 reflected the disquiet with the solution, that had been forced on the fishery, and in clause 8 stipulated that, *"In the event that monitoring shows secondary treatment to be justified the provision of such treatment shall be planned and financed by the Licensee as a priority item."*

Monitoring of the water and oysters started 3 years before the outfall came on stream and by the time several hundred people had been made ill, the Department of Marine invoked this clause on 25th March 1992 **(19)** and requested the County Council to *"advise as a matter of urgency on the steps which the County Council propose to take to install a treatment plant for the sewage discharge at the earliest possible date and the timescale involved."*

We then understood that the County Council's timescale would be that required under the UWWTD – ie. the plant to be up and running by the end of 2005 and thus we launched a High Court action, which brought the date of treatment forward to the end of June 2000. But it is important that you understand that with the human health implications of producing oysters, which will mainly be eaten without any cooking process, treatment means treatment and not the "beneficial effect on the marine life" mentioned in the next paragraph of the Application. Treatment has to be 100% effective – 99% will not do. As explained above, once norovirus is in the oyster tissue, it is extremely difficult to get it out and with a lifespan of at least 6 weeks in the shellfish, a few lapses in treatment will put public health at risk for months.

p.9 line 8

"The Owenacurra Estuary and the North Channel have been designated Sensitive Areas in tidal waters according to the EPA's report on Water Quality in Ireland 2001-2003. The same report highlighted the disimprovement in quality in the Owenacurra Estuary from the period 1995-1999 to the last survey period 1999 - 2003. It has been confirmed that this estuary is eutrophic due to the high levels in the Owenacurra River. A loss of nitrates and Phosphorus from farm land has been identified as the main contributor of these pollutants to the water in the Estuary."

With this water being classified as sensitive under the two EU Directives 91/271/EEC and 91/676/EEC, does not a phosphorous limit apply? In attachment G.2, the County Council say that S.I.258 of 1998 for rivers and lakes does not apply, but certainly M.C.O'Sullivan's thought that phosphorous might require removing/reducing before discharge to sensitive coastal water (1993 Preliminary Report. Appendix 3/6 bottom line) and so, too, do the current Consulting Engineers, J.B.Barry, who state in Volume 1 Schedules and Terms of Payment that the total phosphorous consent for Midleton is 2 mg/l. (see **(1)** para.22)

I have asked for the County Council's evidence that the eutrophic state of the Owenacurra Estuary is due to loss of nutrients from farmland rather than the storm and other overflows etc. from the sewerage system. We are heartened by your news that the water quality of Lough Mahon has improved to intermediate status, which you think is likely to be a reflection of the treatment provided at Carrigrenan WWTP. Based on the marked improvements to the faecal coliform quality of water near the plant, we would be inclined to agree.

p.9 last paragraph

"The most significant environmental impact to the receiving waters associated with the discharge of wastewater from this plant is that of bacteria counts."

The County Council have known from the early 1980's that the most significant environmental impact on shellfish waters of sewage discharges is viral and not bacterial and that bacteria counts do not provide reliable information on the viral risk, via the consumption of shellfish, to human health.

As you know, in 1995 the DOE issued their "UWWTD - Procedures and Criteria in Relation to Storm Water Overflows". With regard to planning for coastal waters and estuaries, they categorize as of "High Significance" discharges from populations of over 10,000 PE that affect identified bathing or shellfish waters, if both criteria apply.

The planning of the siting of the discharge at Rathcoursey was, however, made on the basis of the **bathing water standard**, as spelt out in para. 4.4- 4.6 on p.6/20 (p.98 of the 1996 EIS attached to the Application) although the County Council clearly admit now (p.9 line 16 of the Application) that none of the waters here are recognised bathing waters. The Guideline faecal coliform level set out in the EC Bathing Water Directive is 100 f.c./100ml, whereas it is 7 times as stringent for Shellfish Waters at 14 f.c./100ml. Thus the Environment Agency (UK) require similarly tighter conditions in their "Water Quality Consenting Standard – Disinfection of Sewage Discharges into Controlled Waters" **(8)** para C.4, *"The basic principle to be followed, therefore, is that the siting and design of a discharge, together with the reduction of potential pathogens achieved through on-land treatment (including disinfection), should amount in total to a factor of at least 25,000 fold for Bathing Waters and 178,000 fold for Shellfish Waters."*

Now that there can be no doubt that the Midleton discharge is greater than 10,000 PE and, following the ECJ ruling, C-148/05 of 14th June 2007, that the waters covered by our two Oyster Fishery Orders in Cork Harbour should have been designated in 1981, we do trust that the effect of all discharges into our waters will be accorded a level of "High Significance" as a "Shellfish Water" in coming to your decision on granting a WWD Licence.

p.12 line 4

"As part of the operator's contract, failure to meet specified final effluent quality standards results in financial penalties due to non-compliance. The penalties vary depending on the severity of the pollution caused."

As outlined on p.10 above and **(16)**, these penalties have been invalidated due to the hydraulic loading of the plant being greatly in excess of the level that the Plant Operators were prepared to accept.

p.13 line 6

"Sampling procedures are in accordance with EU and Irish Regulations, and in particular in accordance with the Environmental Protection Agency's (EPA) monitoring and operating requirements. All laboratory analyses are performed in accordance with the latest edition of the Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, and the Water Pollution Control Federation or other methods of comparable accuracy. Regular independent laboratory analysis is also undertaken to externally monitor the operator's performance."

on p.41 line 24, these other methods are further specified :

• *Analysis of samples by the Service Provider are carried out in accordance with the methods specified in the latest editions of:-*

i. The "Standard Method of Examination of Water and Wastewater" (APHA)
ii. Urban Wastewater Treatment Regulations, 2001 (SI No. 254 of 2001)
iii. The "Methods of the Examination of Waters and Associated Materials" published by the HMSO (UK)

It is, of course, vital for the correct management of the plant that accuracy of the on-site laboratory is high and nowhere more important than in the estimation of the organic load arriving to be treated each day. If the on-site BOD figures are good enough to run the treatment plant, and the National Urban Waste Water Study awarded the on-site laboratory Confidence Grade 1 for its measurements of flows and loads **(19b)**, then we feel its BOD and

PE figures should be published in the Monthly Reports. We were heartened when you also took up this call for a fuller disclosure of information in your Audit Report, Recommendation No.3, issued on 1st May 2007 under a Section 63 notice and asked that PE loadings should be shown.

In view of the Plant Operator's claims for their own laboratory above and the NUWWS confidence grading, the County Council's dismissal of your request with, *"This on site lab is obviously not an accredited lab and therefore these results will not be included"* in their reply to your Section 63 audit (B.11), is not helpful and we trust that you will now insist on the inclusion of these important sample results in the Monthly Reports. This will enable us all to work with mutually acceptable BOD loads, rather than to assess them individually from the COD figures given. We would like to ask you to include other important parameters that should be measured and disclosed, which will throw light on the environmental performance of this plant and this would appear to be the place to list these in this submission.

1. **Flow**. A continuous flow monitoring and recording system is the first requirement of the Environment Agency (UK) to record the daily volume and, more especially, the **instantaneous flow** of, at least, the influent and effluent flows, *"with the system verified by an independent expert and records maintained and provided in the format required by the EA."* A daily graphical presentation would show the size of the diurnal variation and any irregularities of flow. We have never been able to obtain instantaneous flow measurements, although we learn now that these are recorded by the Plant Operator (p.42 of the Application). In our estimation, this instantaneous flow data is vital to assessing the potential environmental impact of the plant.

The influent flow should also be measured as it enters the WWTP by the Plant Operator, **not at the pumping stations 600m away and by a different authority (the County Council).** At present, the County Council provides the flow data into the plant, which does not tally with the SCADA data given by the Plant Operator. This SCADA data is totally unreliable c.f. the sample page enclosed from the latest month **(20)**. The National Urban Waste Water Study also commented on the fact that they were not clear if the SCADA covered the pumping stations or not **(19c)**, although we know that the SCADA provides good enough data and control for the plant operator to be able to juggle the flows from Bailick 1, remotely, depending on the height of the blanket in the clarifiers.

The instantaneous effluent flow through the UV irradiation channel is the first monitoring requirement of the EA for their consent of disinfected discharges. It is monitored by the Plant Operator (p.42). It is a standard parameter to be shown in the UV digital and graphical record for Wedeco UV installations and it is of the greatest importance that the instantaneous flow record should be reinstated in the daily graphical and digital records of the UV disinfection system.

2. **BOD and PE** estimations from on-site COD measurements should be published, as mentioned above. We note that there is no problem with publishing on-site SS estimations.

3. **Chloride** is widely used to check balances around the plant, being inert, and as a check that samples are representative. Only effluent chloride figures are now published. There is little point in these unless the corresponding influent figures are given. These were discontinued on 5th April 2001 and should be continued again.

4. **SVI's** are recorded several times a month to report on the settleability of the sludge, but they are always taken in the influent tanks 1 and 5 of the aeration streams instead of where they are wanted in the end tanks 4 and 8, from which the activated sludge proceeds to the settlement tanks and is wasted to the centrifuge. In our estimation, the measurement of settleability in the tanks, which are receiving the crude sewage input, does not provide information of real value. What information it shows is that settlement of sludge in the litre measuring cylinder after 30 minutes, which might be expected to be down to 300ml, is always between 800-900ml and very often no settlement has occurred whatsoever.

5. Comments on the **biological conditions** of the aeration streams were very informative until June 2004. July 2004 rated only 3 lines and then all comment has been withdrawn. In view of the enormous difficulties with settlement that this plant experiences and the varying and very expensive chemical methods employed to try and obtain settlement, details of the microscopic analysis of the bacterial make-up of the mixed liquor and commentary would be most informative. The cost of anti-foam in 2005 was €88,567 and polyelectrolyte is also now used in the clarifiers.

6. **Storage of all records.** The Environment Agency (UK) requires that copies of all records, including the UV record, be maintained for a minimum of 2 years. The County Council requires IPPC Licence holders to keep records for 10 years. We have been advised that the UV records for Midleton will not be kept for more than 45 days, before they are over-written. When the tertiary UV treatment for this plant is of such importance to human health and it is so important to be able to check retrospectively that it has been applied correctly, we trust you will find this to be totally unacceptable. We have recently been informed that the instantaneous flow records for the plant are also only stored "for a short period of time" – so short that records requested for December at the end of January could only be supplied from December 18th onwards.

7. **Certification of plant performance.** The Plant Operator should surely be required to certify that the plant complies with EU and Irish effluent discharge regulations?

8. **The Bailick 1 industrial sewer flow-meter** was dispensed with 3 days before the WWTP came officially on-stream in July 2000. It would seem to be important that this flow is accurately known in view of the high faecal coliform counts that are still being discharged to the sea down the industrial line.

9. **The weir section overflow hours** were recorded each month in the important Bailick 1 storm tank, but stopped on 11th February 2007 and have remained unrecorded since. We would imagine that the recorder would also be set to calculate the **volume of storm water**

entering this tank with a simple integrator and, in the circumstances, would think it is most important that these volume figures should be published.

10. As the discharges from the WWTP are to a Shellfish Water, the correct functioning of the UV system is of paramount importance. **There is no book of maintenance records kept**, which would detail lamp replacements; lamp or quartz sleeve replacement, and especially for lamps that are immediately adjacent to the intensity sensors; cleaning of the transmission meter, etc. The first requirement for monitoring data of the Environment Agency (UK), the **instantaneous flow rate through the UV channel,** should be reinstated on the graphical and digital data records. The flow rate is, of course, required in the vitally important calculations of applied dose etc., and it is of primary importance that it should therefore be shown.

p.16 B.3 Location of the Primary Discharge Point

The location of this discharge is of fundamental importance to the oyster beds of both the North Channel (about 1,000m and 30 minutes away on the flooding tide) and the Lower Harbour (about 2,000m and 45 minutes away on the ebb tide), which were established by Oyster Fishery Orders 18 and 25 years, respectively, before the Midleton outfall was brought down to Rathcoursey Point in 1988.

We believe that by retaining this discharge location, the County Council have set themselves, in practice, an impossible task to provide an effluent of consistently high enough quality to prevent pollution of shellfish. I can advise you, that when faced with a similar proposal to discharge the treated effluent of Stranraer (population 11,000) into the water of Loch Ryan in south west Scotland, where we manage the important native oyster beds, the Food Standards Agency said that Scottish Water could discharge where they liked, provided the effluent was "*100% safe all the time*". Faced with this, Scottish Water opted to pipe their discharge over 8 miles of hills to the open sea, although, as from early March 2008, we understand that SEPA and Scottish Water are in discussion as to whether Membrane Bioreactor (MBR) Technology, coupled with an enormous, existing, sewage holding tank, could provide the security that the FSA require.

The first policy item of the Environment Agency (UK) "Water Quality Consenting Standard – Disinfection of Sewage Discharges into Controlled Waters" **(8)** is, *"The Environment Agency's preference is for continuous and intermittent discharges to be remote from user areas."*

"A discharge of sewage effluent which is remote from the user area (Bathing or Shellfish Waters) will normally be preferred to one which is direct into such an area. ***Wherever a discharge is ultimately located, the needs of the receiving environment and the users of that location must be taken fully into consideration….."***

"Where disinfection is adopted as a long-term solution to poor water quality, the discharger must demonstrate that at least an equivalent degree of environmental protection of the water will be achieved as would be afforded by relocation of the discharge to a more remote

point..... and of a variability no worse than would be expected of a remote solution. Transferring a discharge to a remote location will reduce pathogens in waters through dilution, mortality and other factors. ***The closer the outfall, the greater the risk of contamination if the disinfection technique fails.*** *Disinfection is an addition or alternative to long outfall relocation solutions for achieving desired microbiological quality, but as such it must not lessen the degree of environmental protection afforded."*

In a further paper, issued 25.09.01, "Water Quality Consenting Standard. Consenting Disinfection Systems – Interim approach to refining and reducing microbial monitoring and reporting for Disinfection Schemes", the Environment Agency (UK) refine their definition of "High Risk" areas requiring the maximum monitoring frequency as, inter alia, *"Discharges directly* ***or in close proximity*** *to designated Shellfish Waters under the Shellfish Waters Directive."* **(8b)**

We have already commented on the facts that :

1. It is unsatisfactory that the tidal clock has to be set manually each week and that with the average daily flow of 11,994 m3/day (Table D.1(i)(a)) filling the holding tank in about 4 hours, the incorporation of the holding tank in the scheme for discharge does not do much to prevent the discharge from being released on an incoming tide, which will carry it to the far end of the oyster beds in 2 hours. See pp14-16 above.

2. From time to time faecal loads equivalent to that of hundreds to thousands of people are measured as being discharged at Rathcoursey tank, or at the final pumping station (when the tank is empty) – see p.8 above.

3. We have the advice of the Consulting Engineers, M.C.O'Sullivan's, in their letter to the County Council of 24th November 1999 **(10)** that the plant did not have the capacity to treat the load in 2000 and required the third aeration stream immediately, before the contractor had even finished building the WWTP – and that if the plant were overloaded by 20% or more there would be danger of not complying with the faecal coliform requirements of the Department of Marine's' discharge licence.

4. Also that this cautionary warning of M.C.O'Sullivan's on the organic load, was further re-iterated for hydraulic load by Mr. Tom Ruddy, Technical Director of the Plant Operator (EPS), who is quoted in the minutes of the Tendering Meeting of 06.03.06 **(3)** that *"sustained flows over 90l/s (greater than 8 hours) will wash out mixed liquor and cause failures of treatment standards."*

Flows of such magnitude are likely to occur most mornings, because of the diurnal nature of domestic sewage discharges, but flows of 90 l/s lasting **all day** (rather than 8 hours) – i.e over 7,776 m3/day, occur regularly, as can be seen in the Monthly Reports. In the 6 months last winter there were 65 days when the flow exceeded 90 l/s all day and, in fact, this flow rate was exceeded all month in December 2006 (av. 95 l/s) and January 2007 (av. 92 l/s).

5. Such wash out of mixed liquor from the final clarifiers, or sludge carry-over events, as advised will occur by Mr. Ruddy, causes drops in the transmissivity of the effluent measured at the UV unit. The UV unit cannot disinfect the effluent on such occasions, as the pathogens are shielded from the UV, resulting in discharges of poorly treated sewage to the Rathcoursey outfall and, of course, there is a suspension of solids that will be rich in adhering viral particles. Since July 2002 when we were first given the UV data in graphical form, the number of sludge carry-over events on a monthly basis has been :

Number of sludge carry-over events recorded by the UV unit transmission meter.

Month	2002	2003	2004	2005	2006	2007
January		6	8	0	6	0
February		25	14	8	4	1
March		11	4	12	5	1
April		10	nr	3	5	2
May		12	?	2	10	8
June		5	2	4	1	4
July		nr	nr	0	6	3
August	nr	nr	nr	1	7	6
September	9	nr/2	nr	3	5	4
October	5	8	nr	1	8	5
November	15	5	nr	0	0	
December	20	nr/1	nr	7	1	

nr = no record of transmissivity due to failure of meter

These events all represent substantial falls in transmission for periods of half an hour to most of the day. The solids escaping will be finely divided floc particles, rich in viral particles, which adhere to them through their electrostatic charge and the right size for ready uptake by shellfish. We know that shellfish, ingesting these sewage particles, may retain them for up to 6 weeks and we know also that the standard depuration techniques, that we have, are not reliable in removing norovirus from them.

Shellfish Waters Directive (79/923/EEC)

The European Court of Justice in Case C-148/05 found on 14th June 2007 that Ireland had failed:

- *to designate all shellfish waters requiring designation*
- *to set all the required values in respect of shellfish waters designated or requiring designation*
- *to take all necessary measures to establish pollution reduction programmes for waters requiring designation*

We thus understand that the oyster fisheries of the North Channel and Lower Harbour, covered by the Oyster Fishery (Cork Harbour) Orders of 1963 and 1970 are to be designated Shellfish Waters in the near future.

As the judgement against Italy for failure to designate Shellfish Waters (Case C-225/96 Commission v Italy (1997) ECR I-6887) made clear, the requirement to implement the Directive goes back to 1981. Thus from 1981, Ireland was bound by Article 8 of the Shellfish Waters Directive, which states that, *"Implementation of the measures taken pursuant to this Directive may on no account lead, either directly or indirectly, to increased pollution of coastal and brackish waters."*

By bringing the discharge of untreated sewage 5km closer to the Shellfish Water than its former location around Midleton, the positioning of the outfall was in contravention of the Directive and, being illegal, we believe and trust should not now be licensed by yourselves any longer at Rathcoursey Point.

Natura 2000 site.

The North Channel has long been a Special Protection Area for birds under the "Birds Directive" 79/409/EEC (Cork Harbour 4030) and is also a candidate Special Area of Conservation under the "Habitats Directive" 92/43/EEC (Great Island Channel Site 1058). It has thus been chosen on both grounds to be of sufficient international interest to warrant preservation as a Natura 2000, or "European site" (Reg. 3 of S.I. 648), on which it is incumbent upon Member States to *"take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats..."* (Article 6(2) of the Habitats Directive).

Commissioner Margot Wallstrom spelled this out in "Managing Natura 2000 Sites" as, *"This article should be interpreted as requiring Member States to take all appropriate actions which it may reasonably be expected to take, to ensure that no significant deterioration or disturbance occurs"* and that, *"Article 6(2) applies permanently in the special areas of conservation (SACs). It can concern past, present or future activities or events (for instance, in the case of a toxic spill affecting a wetland, this article would mean that all preventive measures should have been taken to avoid the spillage, even if its location is distant from the wetland)....."* Further, Article 6(2) *"is not limited to intentional acts, but could also cover any chance events that could occur (fire, flood etc.), as long as they are predictable. In case of catastrophes this concerns only the obligation to take (relative) precautionary measures to decrease the risk of such catastrophes as long as they could jeopardise the aim of the directive."*

Meanwhile, deterioration of the waters of the *"Owenacurra Estuary/North Channel – from North Channel (Great Island) upstream of Marloag Point including Owenacurra Estuary upstream to Dungourney river confluence"* has had to be acknowledged in the UWWT (Amendment) Regulations S.I. No. 440 of 15th July 2004, when they were declared eutrophic

and thus "sensitive". Such deterioration is reprehensible. It clearly was foreseen (letter from M.C. O'Sullivan **(10)**), and we trust that this under-capacity plant and the huge overflows on which it depends to bring the load down to a manageable size, will not now be licensed by yourselves in defiance of these EU Directives, which have all been contravened and under the duties of the Agency as laid out in S.I. No. 684 of 2007, Regulation 6.(3)

(a) *cause a deterioration in the .... ecological status (or ecological potential as the case may be) in the receiving body of surface water.*

(c) exclude or compromise the achievement of the objectives established for.... the achievement of environmental quality standards established under national Regulations in relation to..... designated shellfish waters.....

and Regulation (4)

The Agency shall ensure that a waste water discharge is controlled.....; the Agency shall apply stricter limits where, in its view, these are necessary to achieve the environmental objectives established for the water body, and any associated protected area, into which the discharge is or will be made.

Directive 2006/11/EC, which was transposed into Irish law as S.I. No. 684 of 2007 and which now requires the Agency to regulate waste water discharges to protect the receiving environment from pollution, defines "pollution" in Article 2 (e) : *"Pollution" means the discharge by man, directly or indirectly..... into the aquatic environment, the results of which are such as to* ***cause hazards to human health*** *....* ***or interference with other legitimate uses of water."***

Relocation of the primary outfall.

The positioning of the outfall at Rathcoursey Point was bitterly disputed by the Department of Fisheries and Forestry over many months in the early 1980's and I can supply you with this huge file and the DOFF 64 page Submission made on behalf of the fishery in 1984, if you require it.

Once the treatment plant had been required for Midleton in 1992, following the acceptance by the Department of Marine that water quality had deteriorated, the question of the location of the outfall was again paramount. I enclose the opinions of the Department of the Marine:

1. Mr. J. O'Keeffe, Divisional Engineer, Dept. of the Marine, Cork. 29th June 1994 **(21)**

"As there will be adequate dilutions at Ballinacurra to achieve satisfactory physical and chemical quality, it is recommended that this option be chosen. The two miles distance from there to the oyster beds will give a further buffer against bacterial and viral infection."

2. Mr. Michael O'Driscoll, i/c Shellfish Sanitation Programme, DOM, Dublin **(22)**

"I agree with John O'Keeffe's report of 29/6/1994 on the above. We would support Ballinacurra as an outfall location rather than Rathcoursey so as to remove the source of bacterial and viral infection further away from the oyster beds."

3. Minute of the Marine Licence Vetting Committee (MLVC), DOM, 6th March 1995 **(23)**

"The MLVC consider Ballinacurra to be a more suitable outfall location than Rathcoursey as this would move the source of bacterial and viral infection further away from the oyster beds."

Consideration of a Midleton outfall in the 1993 EIS for the Midleton WWTP.

The Impact Assessment of the outfalls of treated effluent at 3 different locations is given in Chapter 9, p31 (p.157 of the EIS attached to the Application). An outfall into the Owenacurra River just south of the by-pass bridge is assessed in paragraphs 1.2 – 1.6, concluding that, *"any outfall at this site is unlikely to have a significant adverse affect on marine flora, fauna or fisheries."*

Hydrodynamic mathematical modelling of a Ballinacurra discharge (24)

This was carried out by Irish Hydrodata in 1997 in response to this Company requesting that the outfall could be temporarily moved back to the position, which had given many years of illness-free marketing of shellfish, whilst the plant was being constructed.

Irish Hydrodata had carried out both dye study work and the previous mathematical model for the 1993 EIS. On this occasion they looked at 3 scenarios:

1. Continuous discharge at Ballinacurra for 60 l/s (2DWF) of 32,000 PE on neap tides
2. Continuous discharge at Ballinacurra for 60 l/s (2DWF) of 32,000 PE on spring tides
3. Intermittent discharge at Ballinacurra for 60 l/s (2DWF) of 32,000 PE on neap tides

River flows of 0.05 to 1.0 m3/s were used.

In all cases, the plume at LW after 10 tidal cycles had never reached far enough to enter East Ferry. If it does not enter the Ferry on the ebb tide, it cannot return to the oyster fishery of the North Channel on the flood tide – it simply gets carried back up the Owenacurra estuary again to give the distributions shown for HW in each of the 3 cases.

All this will alter, however, if there are high flows in the Owenacurra and Dungourney Rivers and, especially, if these coincide with a falling tide, in which case the low salinity river water, brown when in spate, can be seen filling the East Ferry and spilling out into the Lower Harbour. Under these conditions, the flood tide will drive the water that originated in Midleton back to the top of the Ferry, where it will divide roughly 75% to the west and the oyster beds and 25% to the east and Owenacurra. This water will then pass over all the oyster beds, reaching Brick Island in just 2 hours.

Maybe you will feel that to be completely safe the present outfall pipe should be extended 10km to take it to the open sea, possibly taking with it the effluent from Saleen, Cloyne and Aghada, to avoid problems with their discharges into the Lower Harbour fishery, just as SEPA and Scottish Water have done to preserve the Loch Ryan oyster fishery and comply with the Shellfish Waters Directive in Scotland. However, if the Midleton WWTP were to be adequately sized and storm overflows were cut down to the 5-6 p.a., as was planned for, we feel that the 5km of Owenacurra estuary, from the by-pass bridge, could provide the lazaretto effect talked about by Prof. O'Kane at the end of his Modelling Study.

The treated sewage from the WWTP and the treated industrial sewer would be fed by diffuser into the river, as discussed in the Flora, Fauna, Fisheries and Aquaculture Section of the 1993 EIS and all the cost of pumping the effluent to Rathcoursey would be saved.

Should the performance of the WWTP still be thought to be insufficiently reliable, it might be acceptable to polish the effluent through a reed-bed, for which there is sufficient land, and the saving in pumping costs would probably more than pay for the construction and management involved. A well-attended Conference on Constructed Wetlands in Midleton put forward this solution for the town at the planning stage for the Midleton WWTP.

The other alternative that has now been tested in the UK for some years and at an increasing number of sites, where sewage outfalls are impacting on sensitive waters, is the use of Membrane Bioreactor technology (MBR). It appears that this might now be the preferred option for the Loch Ryan oyster fishery, as I mentioned above. The system appears to give superior results to UV as it is clear that effective UV treatment is dependant both on high quality effluent (with high transmissivity) and high standards of operator procedure and maintenance. The first WWTP employing this technology in the UK was Porlock in Dorset and I attach results of the first 5 years of sampling effluent for faecal coliforms and F+ phage and the comparison with a UV plant **(24b).** Swanage is the largest plant in the UK, catering for a summer population of 28,000, with a flow rate of 12,700 m3/day, BOD of 1,524kg/day and ammonia 200kg/day. Both plants are owned by Wessex Water plc.

p.20 B.9 (i)

We do not think that the information being asked for here – *"The population equivalent (p.e) of the agglomeration **to be, or being**, served by the waste water works should be provided"* – has been given, as the County Council are merely restating the design PE for the situation that existed in Midleton **15 years ago**.

The town has grown enormously – probably doubled - since 1993 when the plant was designed for a PE of 10,000. **It is vitally important that the County Council should answer this question as they have all the relevant statistics.**

We have already discussed on p.10 above, regulation 3 of the Waste Water Discharge Regulations, which defines the "population equivalent" load as, *"being calculated on the basis of the maximum average weekly load entering the wastewater works during the year, excluding unusual situations such as those due to heavy rain"* – and on this definition the PE for which the Midleton WWTP should be designed, based on the maximum weekly loadings in the first 4 years, would be 50,000, or 33,700 PE if the first poor year were dropped out. The maximum weekly loadings in 2007, quoted on p.10, varied from 21,000 - 26,754, but it would appear, from the discussion on p.6 above, that as much as 45.7% of the load could be being shed to the estuary. Allowing for this would give a 2007 value for the PE that should be catered for as 39,000.

p.21 Attachment B.10 p.1 line 9

"These works shall reduce the flows going to Bailick 1 Pumping Station and therefore reduce the current spill frequency from the Storm Holding Tanks."

A calculation of the reduction in spills that might be obtainable is given in the reply to your Section 63 Notice by the County Council (in attachment B.11). *"A recent study of the base flow figures collected at the Bailick 1 pumphouse between 2002 and 2005 show that for a reduction of 50% as indicated above the corresponding reduction in spills would be 41%, for a 40% reduction in base flows the spills would be reduced by 36% and for a 30% reduction the percentage reduction in overflows would be in the region of 27%"*

These calculations made by J.B.Barry and Partners refer to the number of spills rather than their magnitude and only refer to spills from Bailick 1. As you can see below, the overflows from Bailick 2, although smaller than those from Bailick 1, have grown in frequency and volume to account for 20% of the pumped overflow spills to the river. But, of greater consequence, J.B.Barry and Partners do not take into consideration in their calculations the volume of the un-pumped, gravity flows through the Bailick 1 storm tank. The County Council's figure for the total volume emitted from the Bailick 1 storm tank in D.1 (iii)(a) in the10 months of 2007 is given as 994,594 m3, or an average of 3,272 m3/day, of which the pumped storm overflows only account for 180,455 m3, or about 18%.

The "pumped" spill record from 2002 has been :

Year	Rainfall	Combined overflows		Bailick 1		Bailick 2	
	(mm)	Total number of overflows	Total volume of overflows m3	Number of overflows >40m3/day	Volume m3	Number of overflows >40m3/day	Volume m3
2002	1,264	193	333,216	139	315,299	54	17,917
2003	908	117	117,954	95	110,224	22	7,730
2004	1,011	131	186,640	89	152,643	42	33,997
2005	1,014	280	314,371	140	259,953	140	54,418
2006	1,140	387	394,796	158	294,380	229	100,416
2007 to Oct.	807	303	263,492	111	180,455	192	83,037

Data for winter 2006/07

Month	Rainfall (mm)	No. >40m3	Total vol. m3	Av. spills/day	Av. vol/day m3
October	152	55	64,272	1.8	2,073
November	173	57	75,589	1.9	2,520
December	161	62	155,327	2.0	5,011
January	70	50	52,891	1.6	1,706
February	137	53	80,202	1.9	2,864
March	77	57	68,022	1.8	2,194

With this record of spills, would even the maximum 41% improvement, estimated from cutting the flow in the sewerage system by a huge 50%, make licensing of discharges of this magnitude credible?

However, the calculations done by J.B.Barry and Partners would pale into insignificance if the figure given by the County Council for the total volume emitted through Bailick 1 storm overflow had been taken into account.

Nor do we give much weight to the excuse that much of the problem of the high hydraulic load in Midleton is due to infiltration of ground water. If this were so and the domestic load each day was presumed constant – from a constant population, infiltration would merely dilute the load. A check through the monthly reports will show that this is not the case. For instance, using recent reports, the highest COD concentration recorded in August 2007 (20th)

of 482mg/l was associated with a flow of 6369m3, whereas the lowest flows of 4843 and 4791 and 4939 had COD's of 323, 316 and 296 mg/l. The highest COD concentrations recorded in September 2007 (4th and 21st) of 770 and 728 mg/l were with flows of 5119 and 5643 m3/d, whereas the only flow that was in the 4-5000m3/d range had a concentration of 492 mg/l.

p.21 B.11 Section 63 notice correspondence

Ref. your UWW Audit Report

p.3 line 13

Your recommendation was, *"The council should provide a list of overloaded waste water treatment plants with details of the design capacity (PE) and* ***actual current PE loading*** *and actions being taken to address the effluent quality and capacity problems."*

We are sorry that this question does not appear to have been answered either here or in answer to B.9 above.

Ref. the copy of the e-mail from Madeleine Healey on 11th December 2006 with regard to the "one" failure of the plant to meet the UWWTD Regulations and the sludge blanket carry-over that was admitted to on 1st March 2006, we would like to inform you that

1. this was only one of about a dozen sludge carry-over events shown up by the UV graphical record in the month of March.

2. the more precise UV digital data was withheld for 1st – 8th March.

3. the bacteriological sampling carried out on the 3rd March was deemed "unreliable".

4. oysters tested positive for both genogroups of norovirus in March and were not negative until 19th April.

Ref. Comments by Cork County Council
p.3 line 18

"If it is felt that more work is required after this Contract is completed then the Council will look at increasing storage capacity at the existing pumping station at Bailick 1 (Phase 2)."

This seems to be a hollow assurance to us, as there is no room for any further storage capacity at Bailick 1, as you must surely know.

p.4 General Note

The County Council would appear to have gone to great lengths to reply to, *"the recommendation from the EPA implies that raw untreated sewage is overflowing into the Owenacurra River. .....progress works without delay to prevent untreated wastewater overflowing to the Owenacurra estuary...."* They say :

"The system is designed as follows

Excess wastewater flows into the storm holding tanks (over and above what is taken directly to the treatment plant). The three tanks fill in series which allows for settlement to take place. If the storm or rain event abates before the tanks are full the volume in the tanks are pumped back into the system and on for treatment at the WWTP. The total volume held in the tanks is 1741.69 cu.m. This combined with approx. 400 cu.m. storage in the pipe network itself is equivalent to approx. 6 hrs storage for the 3DWF volume. This means that the effluent portion of the wastewater is well diluted before, if the storage is beaten, it overflows to a pump sump to be pumped out to the river. The pumps have a 5mm screen attached to prevent any solid matter discharging to the river this further ensures that what is discharged has a negligible impact on its receiving waters."

Yet entirely contrary to what they claim, the storm tanks had had **no** surplus capacity to accept any storm flow **all winter.** For 6 months, from the end of September 2006 till the end of March 2007, the 3 cells of the storm tank at Bailick 1 were completely full – see **(6)**, and, from Prof. O'Kane's photographs, see p.5 above, and the enormous volume of storm overflow emission from Bailick 1 (D.1(iii)(a)), certainly overflowing. They were never less than a third full all summer, when the Council's reply was written, and then were full again by mid-July. Should the Plant Operators have accepted Tender Option B to run the pumping stations as well as the WWTP, they would have been liable for fines of €1,500/day on 173 days.

If the County Council did not know what was going on in the Bailick 1 storm tank, month in month out, last winter, that is as much of an indictment as making this completely misleading statement to you last May. If they knew both and felt that they could get away with it, that is an indictment on the system of control of Local Authority discharges, that existed up to now, and we trust that you will find this paragraph and the rest of this submission enlightening.

p.23 C.1

This attachment contains Appendix 1 and 3 of the 1993 Preliminary Report on Midleton WWTP prepared by M.C.O'Sullivan. Mr. C.J. Mulready has commented in much greater detail on the design and capacity of the WWTP in the second half of this submission, but, in the meantime would observe:

Appendix 1.

We fail to see how these 26 pages of *"calculation sheets used in the 1972* (sic) *Preliminary Report used here for calculating flows...."* are put to use in the 1993 design of the WWTP or storm water holding tank, or how such a low DWF of 2,256m3/day could have been taken as the design flow level for the plant when the flows in the domestic sewer had been measured daily since 1989, i.e for the previous 11 years – and, in fact, were so large that a relief opening had to be made between the domestic and industrial wet wells at the Bailick 1 pumphouse in 1992/93, so that the larger industrial pumps could take up some of the load and pump it on towards Ballinacurra 1 and Rathcoursey - all this being perfectly legal then, as all the sewage was discharged untreated at Rathcoursey Point.

The flow volumes in the domestic and industrial streams were :

Date	Av. domestic flow (m3/day)	Av. industrial flow (m3/day)
1989	3027	3610
1990	3186	2828
1991	3157	2413
1992	2862	2836
1992/93	Ope and flap valve created between	the two sewer lines at Bailick 1
1993	4033	2929
1994	5014	3659
1995	4346	3685
1996	5747	3896
1997	4914	3182
1998	5265	3099
1999	5545	2830

The only thing that we can add is that, having seen theoretical calculations, rather than actual measurements, being used to justify the design of a clearly inadequate system here at Midleton, we were not prepared to accept exactly the same thing being put forward again by Scottish Water for the discharge of UV treated effluent from Stranraer (pop. 11,550) into the centre of the oyster fishery in Loch Ryan, which we manage. SEPA accepted our warning and Scottish Water were to re-site their WWTP and pipe the effluent 8 miles to the open sea.

The above figures are normally taken as representing about 1.3 DWF. A practical measure of the actual DWF is often taken as the domestic flow after a period of 7 days without more than 0.25mm rain. Such estimates made with the domestic flows in Midleton appear to still reflect the winter/summer state of the soil/water table. At the end of last winter, in April 2007, there were 15 days without rain and the domestic flow was 6,632 m3/day. In the driest of all times August/September 2007, we had 19 days without rain and the estimate of DWF was 5,725 m3/day. This is still a massive 2.5 times the design DWF taken for the WWTP of 2,256 m3/day on which this plant is running, unaltered, to this day.

Appendix 3

We shall be commenting in much greater detail on the design of this plant in the second half of this submission, but, just on the question of the hydraulic load that we have been considering above, you will appreciate that the design retention time of 29 hours 34 minutes for 1 DWF (p. 3/5) has never ever even been approached – the flow through the plant being normally on average 2.6 – 3 DWF over the whole month.

We also draw your attention again to the minutes of the meeting in County Hall on 6th March 2006 with those interested in tendering for the operation of the plant **(3)**, where the Technical Director of the current plant operator (EPS) advised on p.2 line 24 that, *"sustained flows over 90 l/s (3DWF) (greater than 8 hours) will wash out mixed liquor, and cause failures of treatment standards."* We have had hydraulic flows through this plant for days and even entire months at over 3 DWF.

You should also remember the comment in the next paragraph of the view of Mr. Noel O'Keeffe, County Engineer, Cork County Council, where it was noted that, *"NOK agreed overflow incidents more defensible than inadequate treatment or plant-downtime."* We would certainly hope that you would not licence a plant where these were the alternatives that had to be decided upon.

Can we remind you, again, that even whilst the plant was still in the construction stage, the designers, M.C.O'Sullivan's, were advising the County Council in a letter of 24th November 1999 **(10)** that, with the additional new housing permissions that had been granted, *"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 Flemming Construction's contract for the following reasons:-*

3) 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 (15,000p.e.),*** *would have adequate capacity until 2007"*

p.24 line 20 (of the Application)

"There is no primary settlement stage."

Following the National Sludge Strategy of 1994, all new treatment plants were required to incorporate primary sedimentation. This could remove 60% of the organic load for treatment elsewhere, but the County Council obtained a derogation on putting in sedimentation tanks from DOE on the basis that this would hold up construction of the WWTP, which was being driven by a High Court order. This hardly stands up, as they had a commitment to DOM to

put in the plant in 1992 and the DOE requirement of 1994 gave them 2 years to alter the design even before the legal action started and 6 years before the plant had to be built.

p.25 line 18

"The sludge treatment process consists of:-"

As mentioned on p.10 above, despite the inclusion of the details of sludge digestion in Sec. F of Appendix 3 (attachment C.1), there is no treatment of sludge at Midleton. It is dewatered and centrifuged and, up till very recently, was taken to landfill (and a willow plantation). This would appear to have been in contravention of the National Sludge Strategy of 1994 and maybe this is why it is now taken for composting.

p.29 Process Diagram

No influent flow meters are shown measuring the influent from Bailick 1 & 2 final pumping stations. According to the Commissioning Manual, these were Danfoss Magflow-5000's installed in the flowmeter chamber and signed off on 10th October 2001 and, we are advised on p.42 of the Application, that they record both the totalised daily and instantaneous flows into the WWTP from the Bailick No.1 and No.2 Pumping Stations. We have requested instantaneous flows into the plant for a very long time to check on the diurnal fluctuation into the plant etc., but all we have been given are the total daily flows that are recorded by County Council employees **manually** each day as they leave Bailick 1 & 2, 670m and 650m away respectively. The total flows recorded by the SCADA system are given on about p.25 of the Monthly Reports, but I don't think I have ever seen one that it is possible to make use of – they are always full of errors. I have enclosed the current month of October 2007 as an example **(20)**

p.33 line 4

"The flow (hydraulic load) to the sewage treatment plant is pumped and is therefore fixed at the pumping capacity of the pumps."

This is a similar statement to that made in the "Serviced Land Initiative Report –Midleton Sewerage Scheme – WWTP Upgrade" prepared by J.B.Barry and Partners in June 2006 to enable funding for the third aeration stream. They say, in an introductory paragraph 3.1, *"The previous section demonstrated that the existing loading from the town may well be in excess of the WWTP's design capacity of 10,000PE, but that this is not being delivered to the plant* ***due to shortcomings in the pumping stations.***"

There are 3 foul pumps in Bailick 1 (Homa Model MX-3452-PU74) capable of delivering 102 l/s (367 m3/hr), but these are cut back to 75 l/s (75% of their capacity) to the 300mm rising main to the plant. Normally just one pump runs most of the day – leaving the capacity of a second pump in hand and one further pump as stand-by.

The 2 Bailick 2 foul pumps are capable of delivering 40 l/s (144m3/hr) to the 200mm rising main to the plant, but they are cut back to 15 l/s (40% of their capacity). No steps have been taken to stop these pumps clogging with waste for some years now. The pumps need lifting by loader 2-3 times a month sometimes. In reply to your Section 63 notice, you were advised (p.3 line 30 of the Council's reply of May 2007) that mechanical mulchers were to be installed shortly to cut down the number of overflows from this pumping station, but the overflows for 2007 are set to be the worst yet. As nothing has been done to rectify this poor state of affairs we can only presume that the resulting overflows are being used as a useful way of losing both organic and hydraulic load. Over the period 1st October 2006 – 31st March 2007, there were only 16 days when there were no overflows recorded from this storm-tank. From 1st April to the end of October 2007 (the summer months) there were only no overflows on 87 out of the 214 days in the period. The storm overflow record is given on pp.28-29 above.

We believe that the statement of the County Council, above, is designed to mislead you into believing that the WWTP has adequate capacity and that it is the lack of pumping capacity at the pumping stations, which is the reason for the storm overflows. **It would not appear to us that the pumping stations lack capacity, as claimed, rather that the Plant Operator cannot attempt to load the plant itself any further.**

p.33 line 11

"By holding 3 D.W.F. for 2 hours it is ensured that any overflow gets at least primary sedimentation, thereby reducing the B.O.D.5 of the overflow by between 30% and 50% of the diluted overflow, thus giving an overflow B.O.D.5 of between 28 and 20mg/l at worst."

I have attached the pumphouse/storm tank data for the 6 months last winter (October 2006 – March 2007) **(6)** and you will have seen by now that the Bailick 1 storm tank was left with completely full cells all winter. On p.5 above, I have alerted you to Prof. O'Kane's comments and photographs, showing that use has been made of the 4 x 600mm gravity openings to the river, which will not be recorded, as flows through the storm pumps are at present. We imagine that the "weir section" hours recorded are translated in the SCADA to volumes passed, but we have not been given these yet and the weir section recorder was disconnected in February 2007 and has not been connected, or mended since.

The County Council laid down how the Bailick 1 & 2 storm overflow tanks should be managed on p.47 of Volume 1 of the Contract documents for the new Plant Operator **(25)**:

"3.3.9. Failure to Manage the Storm Water Handling Facilities.

The Service Provider is required to manage the stormwater handling facilities in a manner that maximises the amount of available storage. Specifically, the Service Provider is obliged to empty the storm tanks in an expeditious manner (return flows to the foul pumps are to start

within 2 hours of inlet flows being lower than the specified pump forward capacity of the foul pumps) to ensure that the tanks have as much capacity as possible for the next wet weather event.

"Failure by the Service Provider to manage the stormwater handling facilities in a proper manner will result in the implementation of penalties equal to the value of all monies due to the Service Provider, for the fixed time based charges associated with that section of the Operation and Maintenance Phase, for each day on which overflow incident occur. Charges measured on the basis of a monthly rate will be assessed in proportion to the number of days in the particular month.

"The penalties, to be deducted from the monies due to the Service Provider, will be subject to a minimum value of €1,500.00 for each day on which overflow incidents occur. This minimum value will be adjusted at the end of each calendar year in accordance with the procedure for adjusting the rates for the Operation and Maintenance Phase."

There were 343 significant spills (>40m3) on 173 days between October 2006 and March 2007, whilst the storm tanks were permanently full. In these circumstances, it is hardly surprising that the responsibility for running the pumping stations and their storm overflow tanks was not taken on by the Plant Operator (Option B) and has been left under the control of the County Council. The point of the penalty system was presumably to make sure that the receiving environment would not be damaged. The value of such transgression was put by the County Council at 173 days x € 1,500 = € 259,500, but, in the event, as the County Council do not fine themselves and the Plant Operator is covered against claims, as the flow into the plant is always double the flow that was acceptable to them for the contract, only the oyster fishery suffered, with samples for the two genogroups of norovirus showing :

October 2006	+ - , + -, + - and + +
November	+ +, + +, + +
December	+ +, + +, + +
January 2007	+ +, + +, + +, + +
February	+ +, + +, + +
March	+ +, + +, + +

i.e 18 out of 18 samples were positive for norovirus (winter vomiting disease) and, moreover, except for October, all samples were positive for both genogroups tested.

p.36 line 15

"The discharge volume to the river outfall can thus be directly monitored by the capacity of the storm pumps and the number of hours of operation of the storm pumps."

Thanks to the observation of Prof. O'Kane discussed on p.5 above, and the possibility of gravity flows to the river of as much as 1,800 m3/hr, by allowing the storm cells to overflow without the use of the storm pumps, this assertion can no longer be trusted. It is difficult to

see how this statement does not fall into the category of being deliberately misleading, in view of the declaration of the volume of effluent being emitted to the estuary from the Bailick 1 storm tank, which is far in excess of the pumped storm discharge.

Over last winter, there were only 34 days between 1st September 2006 and 31st March 2007 when the storm pumps were not used at Bailick 1. Of these days, 18 had no effluent recorded as flowing over the weir section into the storm cells and therefore would have had no need for any outflow, but of the remaining 16 days, there were substantial flows into already full cells and, as the storm pumps did not pass this volume to the river, overflow must have occurred through the 4 x 600mm open pipes to the river, as realised by Prof. O'Kane.

The details of the weir section inflow hours on days when there was no storm pump activity are shown on the attached spreadsheet **(26)**. This strategy was used for possibly 4½ months before it may have been realised that it would show up in the manually-kept records and the weir section meter was disconnected, or broke fortuitously, on February 11th 2007 and, in either case, has not been replaced since. In that time we have only had 9 days, when it is very likely that gravity flows occurred on their own, without the masking effect of the storm pumps coming on.

The weir section meter was not disconnected in Bailick 2, however, and this gives a record of many substantial inflows to the storm tank, with no usage of the storm pumps to evacuate them. This is discussed under consideration of p.37 line 9 re Bailick No.2 pumping station, below.

p.36 line 18

"On cessation of the storm event, 2 No. storm (1 duty/1 assist) return pumps return the accumulated storm volume in the storm tanks back to the pump station wet-well for on-ward pumping to Midleton WWTP. Under normal dry weather conditions the Storm cells remain empty and are flushed clean with a tipping bucket arrangement using water from the drinking water mains, after each storm event."

Clearly this did not happen last winter with the cells remaining full. We have asked repeatedly what happens to the sludges that accumulate at the bottom of the cells, which used to cause the "shock loads" at the WWTP in earlier years and we have been told that they are not disposed of to tanker etc.

General observation on the storm water overflows.

The application to the DCMNR for the foreshore licence required to discharge the Midleton effluent was accompanied by an Addendum to the Environmental Impact Statement of November 1996 **(27)**. This estimated a necessity for a storm overflow facility for between 1.0-1.5% of the total storm water collected in the catchment (p.7) and calculated that this would equate to no more than 2,973 m3/annum (p.8 & Appendix 1)and that there would be no more than 5-6 overflows to the river p.a. (p.7). The Midleton public were given this

figure for the number of overflows also at the presentation by M.C. O'Sullivan, on behalf of the County Council, of the impact that the new WWTP would have on the environment.

The Environment Agency (UK) in their "Consenting Conditions to Achieve the Requirements of the Shellfish Waters Directive (Microbial Quality", issued on 25/09/01 **(28)**, have agreed with DEFRA and CEFAS that, *"para 4.2.7 Where the need for improvements to intermittent discharges (including storm tanks at sewage treatment works) discharging into or affecting Shellfish Waters has been identified, the discharger will be required to demonstrate that the frequency of significant independent spills (see section 6.2.7 of the AMP2 Guidelines which states "in general.... for design purposes a spill greater than 50m3 will be significant") should be limited to 10 per annum on average (over 10 years)."*

"4.2.8. For schemes where the spill frequency design standard is used, the frequency of independent spills may be limited to less than 10 per annum on average on a site specific basis, if the duration or impact of the CSO is considered to be longer than 24 hours."

The storm overflow situation is given to us every month under FOI by the County Council and we would be more than happy to provide you with our spreadsheet of all the overflows, on a day-by-day basis, at each of the Bailick 1 & 2 pumphouses since 2000, if you would find this useful. The annual summation of numbers and overflow volumes was given above on p.29.

Most papers on shellfish water contamination by sewage now seem to regard storm water overflows as untreated sewage (e.g. see pp. 3 & 7 of **(9)**). The storm overflows at Bailick 1 which flow straight through to the river have often been pumped and comminuted by the smaller out-stations on the way and will have passed out with very little sedimentation. This is shown up by the grab samples made by the County Council over last winter **(29)** and also **(4)**, which showed levels of 1,000,000 -12,000,000 f.c/100ml in the tank. Comparison of these storm tank samples with those of the influent to the WWTP, showed that they were in fact actually higher than the influent to the WWTP on 32% of the days.

p.37 line 9 re Bailick No.2 pumping station

"There is 1 No. storm tank and 2 No. storm pumps operating in duty/standby mode discharging to the river via a 600mm diameter outfall pipe. The discharge volume to the river outfall can thus be directly monitored by the capacity of the storm pumps and the number of running hours of each pump."

We get figures for the operation of the weir section each month for this pumphouse, see **(6)**, which shows that effluent is regularly overflowing the weir section into the storm chamber, often for 18hrs – 24hrs a day. Without knowing the volumes entering over the weir, which we imagine are automatically calculated and recorded on the SCADA system, we cannot, however, estimate what addition to the pumped overflows might be made by this contribution to the gravity outflow at either of these pumping stations when the pumps are not used.

We have advised you above that the weir section recorder was turned off (or broke) in the Bailick 1 storm tank on 11th February 2007, but we are, however, continuing to get useful information from this smaller Bailick 2 situation and the summer months from 1st April to 31st October 2007 had 87 days with zero or negligible pumped storm overflows out of the total of 214 days in the 7 months.

On many of these days the weir section was, however, overflowing into the storm tank for a substantial part of the day and up to 24 hours/day - **without the storm pumps switching on** – leaving the storm overflow water to flow by gravity to the river or, perhaps, as we have been told (see 2 paras. below) to Ballinacurra 1. Days when the storm pumps were not in use and yet the weir section was overflowing substantially into the tank, are shown below and days when the storm pumps were not used and gravity flow must therefore be presumed to remove the inflow, are shown in bold.

April **1** 7 **8** **10** **14** **22** **27** 28 **29** **30**
May **1** **9** **11** 13 **15** **23** 24 25 26 27 28
June **4** 5 6 7 8 9 10 11 **17** **24**
July **3** **11** **12** **20** 21 **22**
August **3** 4 7 8 9 10 11 **12** 20 21 22 23 **24** **25** 26 27 28 29 30 31
September 1 **2** **3** 4 **5** **6** 7 8 9 10 **12** **13** **16** **17** 18 19 20 **22** 23 **24** **25** **26** **28**
October **5** 8 9 10 **11** **20**

I attach a spreadsheet of the hours for which the Bailick 2 overflow tank was filling when none of this volume was pumped by the storm pumps **(30)**.

We have been aware for many years that the flows pumped out of the final pumphouse, Ballinacurra 1, are about 3,500 m3 greater each day than the flows it receives of treated sewage from the WWTP and the industrial line from Bailick 1 pumphouse, as you can easily verify from the daily pumphouse records (knowing that the Bailick 1 industrial pumps deliver about 550m3/hr). I have attached a set of these covering the 6 months last winter **(6)**, when the average extra flow out of Ballinacurra 1 increased, in fact, to 4,170 m3/day. These extra flows have now been accounted for by J.B.Barry and Partners in Volume 2 of the new Contract documents. In paragraph 3.12.1, p.56 **(31)**, they explain that, *"The Ballinacurra No.1 Treated Effluent Pumping Station is required to receive all treated effluent flows from Midleton WWTP and treated industrial effluent from Bailick No.1 industrial sump. During periods of heavy rainfall the pumping station will also receive storm water flows from Bailick No.2 and Ballinacurra No.2 foul pumping station."*

Thus it would seem that some of the un-pumped flows out of Bailick 2 may simply join the industrial sewer or the treated effluent from the WWTP, both of which pass within a few feet of the pumping station. The County Council have not advised you of this flow of untreated sewage to Ballinacurra 1 and the Rathcoursey Point outfall in the Waste Water Discharge Licence Application, but, as stated on pp.5-6 above, over the 10 month period considered in the WWDL Application by the County Council, this unaccounted-for, surplus flow averaged

3,560 m3/day, or 1,082,170 m3 over the 10 month period – about 23% of the total sewerage flow.

p.37 line 17

"Ballinacurra No. 2, Untreated Effluent Pumping Station.

Ballinacurra No. 2 Untreated Effluent Pumping Station contains the following equipment: -
- *2 No. Storm Pumps;*
- *1 No. 6mm stainless steel mesh Screen;*
- *1 No. 450mm overflow pipe to manhole;*
- *1 No. 450mm outfall pipe to river with flap valve;"*

Is the Application correct that there really are no foul pumps? nor do they list Pump P-05 in the storm overflow chamber (in the Process and Instrumentation Diagrams in attachment C.2), which according to the monthly pumping details, enclosed **(6)**, you will see, appears to be running for 24hrs/day. The County Council have advised us that the "running hours" refer only to the fact that this pump is switched on for 24 hours/day, but this would seem very odd and would warrant your investigation.

We are not told where the "*450mm overflow pipe to manhole*" in the list above, connects to, but I have alerted you in the preceding paragraph that J.B. Barry and Partners have told us that, during periods of heavy rainfall, storm water flows from Ballinacurra 2 also go to Ballinacurra 1 to be pumped on to Rathcoursey, so maybe this is where the manhole connects to.

No flow of untreated sewage to the estuary from this pumping station is advised by the County Council in their WWDL Application.

p.37 bottom re Bailick No.3 pumping station

"Bailick No. 3 pumping station is an emergency storm overflow which is utilised in the event of power failure."

We have no details of any overflows from this pumping station and an FOI enquiry to the County Council elicited the reply on 2nd November 2007, *"No records exist as there is no storm water facility."* This statement is at odds with the one above, but, presumably, if it is *"utilised in the event of power failure"*, as it says, the recording instrumentation will be unable to work without electricity and there will be no record of overflows?

The Midleton Schematic of the Network on p.27 of the Application shows that Bailick 3 receives the effluent, which is pumped up from the Ballinacurra 2 submersible pumping station, which, together with other untreated domestic effluent which flows into it, is pumped on to Bailick 2. We have been advised by the County Council in reply to an FOI enquiry that

the Bailick 3 foul pumps have a capacity of 90 l/s, or 324m3/hr, so, knowing the hours run from the monthly pumping station records, we can calculate the volumes being pumped out of Bailick 3. These are always far greater than the volume pumped on from Bailick 2 to the WWTP, together with the storm overflows pumped to the river, although Bailick 2 also receives a certain amount of additional untreated effluent from its own neighbourhood.

I attach a graph **(32)**, from which you will see that neighbourhood inflow to Bailick 2, on top of the pumped flow from Bailick 3, started at about 9,000 m3/month at the start of 2002 and dropped to about 3,000 m3/month by February 2004. After that, the original influent, which will have undoubtedly also increased, turned into a negative value as more and more of this flow, together with the rising volumes from Bailick 3, failed to be accounted for by the flows out of Bailick 2 to the WWTP, or by the storm overflows. They reached their worst loss last October with 149,000 m3 from Bailick 3 plus all the unknown neighbourhood flow into Bailick 2 – at least an average loss from the system of 4,800 m3/day.

The losses between this pumphouse and Bailick 2 are now regularly 2,000 m3/day, so we would suspect that this overflow adds to those in the 2 sections above, which carry surplus flow in periods of heavy rainfall to the Ballinacurra 1 pumphouse and thence, untreated to Rathcoursey Point.

p.38 Attachment D.1(i)(a)

This concerns the primary discharge point at Rathcoursey Point.

In the period 1st January – 31st October 2007 the total volume emitted is 3,646,225 m3 over 304 days, with an average daily value, therefore, of 11,994 m3. The maximum value per day can clearly not be below the average daily volume and it is certainly far above the strange figure of 8,760 m3/day given. From the records we get each month, the maximum flow emitted would appear to have been 22,258 m3/day on 20th February 2007.

The average daily flow rate should therefore be 11,994/24 = 499.75 m3/hr and the max. daily flow rate would be 22,258/24 = 927 m3/hr. – not the 365 m3/hr given.

I should like to make two points on the figures given by the County Council;

1. It would have been more representative of the full year not to exclude the two previous mid-winter months of November and December 2006 – especially in the context of a discharge to shellfish producing waters, as these are the peak harvesting months. Inclusion of November and December 2006 would have increased the average daily flow to 12,455 m3/day emitted at Rathcoursey over the whole year to 31st October 2007, with an average flow rate of 519 m3/hr.

2. The discharge figures given for the Primary Discharge Point, do not reflect the entire discharge from the Midleton sewerage system, as there are, of course, the very substantial storm overflows near the town – both pumped and gravity.

Adding the pumped storm overflows to arrive at the figures sought above – but for the full-year period to 31st October 2007, the figures for D.1(i)(a) become :

Volume that would have been emitted (i.e incl. pumped storm overflows) :	5,040,941 m3
Add gravity overflows (in 2007 only) from next para.	814,139 m3
Total flow in the Midleton sewerage system	5,855,080 m3
Average emitted per day from the system :	16,041 m3/day
Average hourly flow rate :	668 m3/hr

Attachment D.1(iii)(a) SWO3 MIDL Bailick 1 storm overflow

The volume emitted is given as 994,594m3 from 1st January to 31st October 2007. In this period the total pumped storm overflows were 180,455 m3, which would appear to leave the overflows by gravity, through leaving the storm cells full, at 814,139 m3, or on average, over the 117 days we are told these took place, a gravity flow of 6,958m3/day.

The pumped storm overflows over the 117 days would have been, on average, 1,542 m3/day.

The importance of excluding the November-December mid-winter months can be appreciated by noting that the pumped storm overflows were twice as high, the average over this two month (61 day) period being 3,063 m3/day. Please remember that for an oyster fishery, the Christmas and New Year sales made in these two months are paramount. In France, for instance, half the annual sales of oysters occur at the end of year festivals of Christmas and the New Year. This is the real, practical use that this water is required for as a Shellfish Water – and it is imperative that people are not made ill.

Attachment D.1(iv)(a) SWO4 MIDL Bailick No.2 storm overflow.

The volume emitted that is given here is the figure for the pumped storm overflows to the river, which are given as occurring on 205 days of the 304 day period. This is incorrect. In Table E.1 (ii) Waste Water Frequency and Quantity of Discharge, the frequency is given as 223, which is the correct figure for the 304 day period.

With this storm overflow tank, we are told that the gravity overflow at times of high rainfall is directly to the Ballinacurra 1 pumping station **(31)**.

Attachment D.1(v)(a) SWO5 MIDL Ballinacurra No.2 storm overflow.

We are told that in time of heavy rain there is gravity flow from the storm tanks here directly to Ballinacurra 1 pumping station **(31)**.

p. 39 Table E.1 (ii)

We do not understand why the County Council state that the storm overflows from Bailick 1 & 2 storm overflow tanks do not comply with the definition of storm water overflow, which we take to be that in S.I. 684 of 2007 – meaning, " *a structure or device on a sewerage system designed and constructed for the purpose of relieving the system of excess flows that arise as a result of rain water or melting snow in the sewered catchment, the excess flow being discharged to receiving waters.*"

p.40 Attachment E.4

The effluent sampling results for 12 months are given. From July 2006 onwards the average monthly BOD and SS results are:

BOD	3	3	3	2	2.5	2.0	2.3	2.5	2	2	3	2.8 mg/l
SS	7.6	7.5	7.5	7.36	7.5	7.5	7.4	7.4	7.5	7.5	7.5	7.6 mg/l

The discharge consent for the Midleton WWTP is BOD 20mg/l and SS 30mg/l. The above results are **6-10 times** better than they need be for BOD and **4 times** better for SS. The electricity cost, mainly for pumping and aeration, is €198,000 p.a.

The Plant Operator is not paid for any reduction in effluent levels of BOD and SS below those consented (Tender Documents Vol.1 Clause 3.4), so producing an effluent to such a high standard and so far above that required, would make no economic sense whatsoever.

We believe, rather, that these apparently excellent effluent results show that very little sewage is being put through the plant. This will be dealt with more fully in our consulting engineer's report, but the dissolved oxygen levels recorded in the aeration streams (about p.16-18 of the Monthly Reports), which can rise to as high as 7-10 mg/l, would seem to bear out the fact that the aeration tanks, on many occasions, contain little more than fresh water.

p.41 Sampling

This page clearly shows that the Service provider is providing flow monitoring, sampling and laboratory analysis of refrigerated samples, agreed with the County Council, to the very high standards laid out in line 24 *et seq*. The Service Provider's approximations from COD analyses for 5-day BOD5 analyses are needed to run the plant and, of course, are standard practice at WWTP's throughout the land, and it would be helpful in analysing the

performance of the plant that these BOD figures and their corresponding PE's should be published in the Monthly Reports. You requested this in your Section 63(3)(a) Advice and Recommendations of 01/05/2007, to which the County Council replied, *"This on site lab is not an accredited lab and therefore these results will not be included."*

I hope that this new requirement to obtain a WWD Licence from yourselves will now allow you to require :

1. That on-site sampling results be published in the Monthly Reports, so that we have their assessments of all the daily loads coming into the plant.

2. That on-site sampling be randomized so that samples are not taken on the same day each week.

3. That spot checks can be made from time to time by yourselves, as is the practice of the Environment Agency (UK).

4. That the final bullet point, *"All parameters necessary to demonstrate the proper performance of the treatment process including the other flow monitors on the WWTP and DO, SVI & MLSS monitoring"* will include the list that WWTP's would normally be expected to keep, which we put forward under the consideration of Application p.13 line 6 above.

p.42 line 1

"The following parameters are monitored and recorded:"

- *Totalised daily and **instantaneous** flows into the WWTP from the Bailick No. 1 & No. 2 Pumping Stations;*
- *Totalised daily flows into the WWTP from other sources including imports;*
- *Totalised daily and **instantaneous** flows gravitated from the WWTP to the Ballinacurra No. 1 Treated Effluent Pumping Station and the proposed Dwyers Road Pumping Station;*

We have asked many times for the instantaneous flows into and out of the plant and have been told these were unavailable. This is the first item of data required by the Environment Agency (UK), *"A continuous flow monitoring and recording system, to a specification provided by the Agency.... shall be provided and operated to record the daily volume and instantaneous flow..."* and clearly defines the pattern of running the plant, the diurnal variations that it experiences and any out of the ordinary patterns of flow a plant could be expected to have to cope with.

By contrast the SCADA records are always so poor that not even totalised flows are ever recorded correctly. I have enclosed the latest October 2007 SCADA results by way of example **(20),** but invite you to look at any other month you may care to choose.

p.43 line 11

• *Weekly Salinity analysis of 24 hour flow proportional samples of the treated effluent discharged from the WWTP – Sample Point 2;*

As you will no doubt be aware, as salt is inert and passes through the plant unchanged, salinity measurements of the influent and effluent allow balances to be carried out on the plant and to verify that samples are representative. It is therefore very necessary for these useful checks that salinity samples are taken of the influent as well as the effluent. The influent sampling was dropped at the end of March 2001. We hope that you will agree that it should be reinstated.

p.47 line 4

"Assessment of Impact on Receiving Surface or Ground Water Owenacurra Estuary and North Channel

"According to the Environmental Protection Agency's 2005 report 'Water Quality in Ireland 2001 – 2003', the Owenacurra Estuary has been shown to have disimproved in the period since the last assessment (1995 – 1999) now being categorised as a Eutrophic water body. The disimprovement in water quality from potentially eutrophic to eutrophic is largely due to the high levels of nitrogen in the Owenacurra River."

Prior to 2000 all of Midleton's sewage was being pumped raw into the sea at Rathcoursey point. That it should have then disimproved following the "treatment" of the sewage at the new WWTP, demonstrates in the clearest terms that the plant is not doing its work and supports our contention that the plant is only able to treat a fraction of the load that Midleton is now providing – the rest being lost in the massive storm overflows and other losses of untreated sewage from the system pointed to above and in our consulting engineer's report.

By contrast, it is good to hear that you are optimistic that the improvement in water quality and up-grading of Lough Mahon is probably due to the treatment of the City's sewage at the new Carrigrennan WWTP. Incidentally, this is not given credit in line 20:

"Cork Harbour is one of six water bodies which since the last assessment has retained its status as eutrophic."

p.48 line 18

"The main land use within the site is oyster farming however the main threats to its conservation significance comes from road works, infilling, sewage outflows and possible marina developments."

The page above has advised that the North Channel is an SPA for birds and has also been designated an SAC under the EU Habitats Directive, transposed into Irish Law in the European (Natural Habitats) Regulations, 1997 as amended in 1998 and 2005. The European Court of Justice Ruling C-148/05 of 14th June 2007, on the failure of Ireland to designate Shellfish Waters, means that the North Channel and Lower Harbour fisheries will be designated in the very near future.

All of these facts, together with the fact that the discharge from Midleton into the water between the two fisheries, is now well over 10,000 PE, would, we hope, grant the water "High Significance" status as defined by DOEHLG.

The "main land use of the area" – the oyster fisheries of the North Channel and Lower Harbour, which have been in existence for 38 and 45 years respectively, may be facing the threats of road works, infilling and possible marina developments, though I have not been aware of any of these threats in any part of this time. However, both fisheries have been destroyed and closed down since October 2002, because of persistent contamination with human sewage, causing the recorded illness of over 1,000 consumers of Cork oysters between the dates of December 1988 and October 2002.

p.49 G.1 Table 1.4

As a point of information, the faecal coliform standards given refer to shellfish **tissue and inter-valvular liquid** and to an end-pipe water standard. The water standard that used to apply to Shellfish Waters was 14 f.c./100ml. This has been superseded by the flesh standard in Europe. Shellfish are thought to accumulate bacteria by about 100 times.

p.49 G.2

As the area has been declared a sensitive area, I believe phosphorous limitation is required?

p.51 line 2

"The current treatment standards that the WWTP is operating to is contained within Cork County Councils application to the Department of the Marine & Natural Resources for a Foreshore licence in April 1998...."

The Application made to the DOMNR in April 1998 stated that the storm overflow volume from the Midleton sewerage system would lie between 1.0 – 1.5% of the total storm water collected in the catchment; that there would be no more than 5-6 spills p.a. and that the anticipated total volume of storm overflows each year would be 2,973 m3 p.a. **(27)**. There were 49 **daily** spills greater than this estimated **annual** figure over the 6 months of last winter; the total pumped storm overflows were **130 times** larger than this figure and the figure that the County Council give for the overflow for the 304 days this year from Bailick 1 of 994,594 m3 in D.1(iii)(a), which must include the gravity flow, is, on its own, **335 times** this estimate.

The number of significant spills to the river was **65 times** over what was planned for in the EIS.

It is thus clear that the Midleton sewerage system is **not** operating to the standards contained in the County Council's application to the Department of Marine and Natural Resources.

p.51 line 9

"In addition the application states that UV disinfection will also be installed on the final effluent that will have the effect of reducing the faecal coliform numbers in the discharge by a factor of 10,000 over that presently discharging (prior to the construction of the WWTP)."

The geometric mean of the influent sewage E.coli levels to the WWTP for the full year from 1st November 2006 to 31st October 2007 was 1.8m f.c./100ml. To comply with the requirement to reduce faecal coliforms in the discharge by a factor of 10,000 the discharge should therefore be no more than 180 f.c/100ml. Over the last year, 12 samples taken at Rathcoursey, or, failing that, at the Ballinacurra sump, complied and 34 did not. 16 of the latter were over 1,000 f.c./100ml and the highest count at the Rathcoursey tank was 70,000 f.c./100ml and at the Ballinacurra sump, when no sample was taken at Rathcoursey, was 200,000 f.c./100ml.

Thus the County Council are failing to meet the 10,000-fold reduction in faecal coliform numbers over what would be discharging if the WWTP were not there.

The end-pipe limit imposed by the foreshore licence of 250 f.c./100ml only gives protection to the discharge to the sea if that is where the inspection point is. Clearly there is a huge difference between samples taken at the UV unit inside the WWTP and what is actually discharged at Rathcoursey, which bears no relationship. The Waste Water Discharge Licence covers the discharge to the sea and we trust that you will agree that the end-pipe standard that was set in the foreshore licence was clearly meant to cover this – as it is the discharge of the entire Midleton sewerage system, which is of the only relevance to the state of the receiving water and the oyster fishery – and which now requires to be licensed.

p.52 Table 1.1

The consent for Midleton WWTP is 20 : 30 not 25 : 35, as is given here and quite often in the monthly reports. This follows from the County Council's own standard set in their EIS and this was certified by the Minister for the Environment on 14th July 1997.

p.52 end of page

"The Third Schedule of the 2001 Regulations gives a list of sensitive areas which in accordance with Article 4 (2) (a) for population equivalent above 10,000PE in sensitive areas require phosphorus and nitrogen consents in accordance the Second Schedule (Part 2). The Owenacurra River/Estuary is not identified as a sensitive area and current the plant is design for a PE of 10,000 therefore this part of the regulation does not apply."

It has already been acknowledged on p.9 line 8 and p.47 line 13 of the Application, that under the WFD the Owenacurra Estuary and North Channel have been designated as sensitive and therefore require a nitrogen consent and possibly a phosphorous one also. The Urban Waste Water Treatment (Amendment) Regulations 2004 S.I. No. 440/2004 identifying the estuary as sensitive was surely passed long enough ago to be acknowledged here?

p.55 Table 1.4

As regards the faecal coliform parameter, the Irish Regulations in the Quality of Shellfish Waters SI 268 of 2006 give no mandatory level, but the Guideline Value given in Schedule 4 is, of course, expressed per 100ml of flesh and inter-valvular liquid. The Foreshore Licence was for an end-pipe water value. The two cannot be compared. It is generally accepted that shellfish concentrate bacteria by about two orders and viruses by about three orders of magnitude.

CONCLUSION.

We believe we have found many items in this application, which are inaccurate; many which we feel are misleading; many items where the true situation, both as represented in the application and also on the ground, have been concealed; and other items, again, which you may not think have been described truthfully.

We show in the attached submission of our consulting engineer that the plant has never had the capacity to treat even the 1993 design load and could certainly not handle the frequent "shock" loads that it has received and continues to receive, with the cleaning out of the sumps of the two storm tanks. Mr. Mulready's calculations only bear out the lack of capacity in the plant foreseen by M.C. O'Sullivan's in 1999 when they called for an immediate upgrade to 15,000PE **(10)** because of the increased building and the possibility of handling a relatively small extra load of 594 PE from Dawn Meats. This has now to be seen against the probable growth in Midleton to date of something like, at least, a further 10,000 PE.

It is clear that the County Council's strategy is now to shed both hydraulic and organic load, so as not to overload the plant. This has dire consequences for the spread of human viral pathogens and has resulted in the near 100% viral contamination of the shellfish waters into

which the discharges find their way. The Acting County Engineer's strategy to keep the plant working; avoid incriminating effluent results and to avoid downtime **(3)** is being won at the very high price of huge overflows of untreated sewage out of the Midleton sewerage system into the environment generally (a million tons p.a. through the Bailick 1 pumped and gravity overflows and another million tons p.a. via overflows to the final pumping station, Ballinacurra 1); the illness of hundreds of members of the public and the permanent closure of two oyster fisheries that have been in existence for 45 and 38 years – fisheries, which once accounted for a third of the value of Ireland's oyster exports and considerable prestige for the shellfish industry on the London market.

With the information, which we have given you here, we hope that, with the powers that you have under Regulations 4(3) and 35(1) and with the use of this submission, you will be able to elicit the true, accurate and complete facts from both the County Council and the Plant Operator, which will enable you to determine the scale of the problem in Midleton and that you will not see fit to licence the discharges from this waste water treatment plant, until 1) the plant is very substantially upgraded and 2) the primary outfall is removed from such close proximity to the shellfish waters of the North Channel and Lower Harbour, so that the safe harvesting of oysters may re-commence.

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(1)

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: 16th February 2006
Ref.: Y5335/2.0/303/RJK

RE: MIDLETON, KILLEAGH, CASTLEMARTYR, CLOYNE OPERATE AND MAINTENANCE CONTRACT
Tender Queries and Additional Information No. 1

Dear Barry,

With reference to the above Contract there has been a number of tender queries and requests. Please find below a list of the tender queries raised and our responses:-

Contract Clarifications:-

1) Volume 2 Clause 1.6 Service Provider's Risk and Responsibility – the Service Provider will be responsible for all latent defects. Please provide any structural reports on all civil, mechanical and electrical assets in order to allow assessment of risk? This request had been forwarded to Cork County Council however it is unlikely that any reports exist. The Contractor attention is however drawn to Volume 2 Clause 2.2.1 Pre-inspection of the existing infrastructure and that during the tender period the tenderers are to undertake their own assessment of the condition of all the existing infrastructure to be handed to the Service Provider as part of this Contract both in terms of condition and in terms of compliance with current health and safety legislation.
2) Can you confirm who is responsible for the charge for the independent audit of the Performance Management System? The independent audit will be organized by the Liaison Monitoring Committee and will be undertaken by an outside agency. The charge for the independent audit will be directly to Cork County Council and will not be paid through this Contract.
3) The security system at the top gate on the private access road to the Midleton WWTP from the N25 has been vandalised several times and is currently not operational. Is it the Employers wish to ask the Service Provider to cost and include its continual maintenance? This has been forwarded to Cork County Council to confirm if they require continual maintenance of the top gate.
4) Volume 2 Clause 3.2 states that the Service Provider is to accept imported sludge at Midleton and the other three WWTP's. How is this to be costed and recovered, as there is no chargeable rate for acceptance and handling of sludges at the smaller treatment plants? These sludge's will be paid for when the sludge is transported from the site and paid for on m^3-Km basis and the return liquors will go through

the treatment process and through final effluent flow monitor where payment will be made on m^3 of wastewater and liquors treated.

5) The reports for Killeagh, Castlemartyr and Cloyne state the KW hours are recorded on the Schedule in Appendix B but do not appear to do so. The schedules appear to show hours run only. We would be grateful if this data was made available? Passed to the current operator to provide this additional information.

6) Bailick 2 pumping station in Midleton, suffers from frequent blockages of these pumps with rags and other material. Operations staff visit this site to unblock the pumps on average twice per week. This incurs significant operating costs, especially when one considers there is no lifting equipment and a loadall is required each time to lift these pumps. Are these costs to be risked into the Contract, which may not offer value for money for the client or should an additional chargeable rate be added to the schedule of rates for each occurrence? These costs are to be risked into the Contract. If the Service Provider then undertakes Capital Replacement Fund work to solve the current problem then Volume 1 Clause 3.3.13 Variations to the Contract will apply - Any savings to the Employer, as a result of variations requested by the Service Provider and approved by the Employer's Representative, will be shared equally between the Service Provider and the Employer. The value of the savings will be determined by the Employer's Representative, who will take account of the expenditure incurred in implementing the variation. The Service Provider will receive any savings due to him at the time of his payment application for the elements of the works that have been affected. In particular where the variation has resulted in a reduction in one of the rates for the Operation and Maintenance, the Service Provider will receive the proportional benefit for this item with every payment application identifying the particular rate. The benefit will be adjusted for any changes in cost in an identical manner to the adjustment of the rate.

7) Midleton WWTP currently consumes large volumes of antifoam to control foam formation on the aeration basins and subsequently the final clarifiers. Is this cost to be included for in the routine operate costs. Should the problem be eradicated, this cost will be included for in the fixed costs for the full ten year operate and thus not providing value for money for the client. Given the costs involved, should a separate cost centre be provided in the event it is not required in the future? Please also advise if there is to be capital expenditure provided for in the schedules to deal with the foaming. These costs are to be risked into the Contract. If the Service Provider then undertakes Capital Replacement Fund work to solve the current problem then Volume 1 Clause 3.3.13 Variations to the Contract will apply.

8) Please advise if there is to be a capital allowance in the tender documents to allow the increased volumetric and organic loadings above design to the WWTP. The Service Provider is to operate the plants within the required process requirements as detailed in Volume 2 of the Contract Document. If in the future additional development takes place within the catchments that will exceed these thresholds then capital work will be undertaken to increase the volumetric and organic loadings of the plant. Volume 2 Clause 1.3.1 states that it has been agreed with Cork County Council that there will be no Design and Build (DB) element to this Contract. However the Contract Documents do allow for the provision for Design and Build works to be undertaken during the O&M period, which will allow for future expansion. Any such Design and Build Contracts will be tendered and let under separate tender contracts in accordance with the E.U. Procurement Directives. The Service Provider will be required to cooperate with the successful Design and Build

Tenderer. Therefore this document makes adequate provision for maximum flexibility in Contractual terms for Cork County Council itself to negotiate reasonable access terms and charges, as and when the occasion arises in the future operation of these treatment facilities.

9) Can the industrial effluent volumes pumped from Bailick 1 pumping station to Ballinacurra pumping station be forwarded please. Passed to Cork County Council to provide this additional information.

10) The documents state that the Contractor is to be responsible for the rising mains from the Midleton pumping stations to Midleton WWTP and from Ballinacurra to Rathcoursey outfall. Please provide all details on these lines, construction materials and burst history, etc on these lines in order to allow the contractor to assess the associated risk. Locations of the mains are shown on drawings 9253-N100 to N107. Details on construction material and burst history has been passed to Cork County Council to provide this additional information.

11) What are the implications of non performance at the pumping stations where those pumping stations receive effluent from industry (e.g. Ballinacurra) For instance, the Contractor has no direct responsibility to the industrial discharger. The Service Provider is to be able to receive flows and loads at all times as stated within the IPC licenses. Flows and loads outside these parameters will mean that the Service Provider shall not be liable if the plant is unable to cope with these additional flows or loads however he shall ensure his best endeavors to still treat these flows and loads to the required standards as stated in the Contract Document.

12) The documents (Volume 1 Schedules and Terms of Payment 3.5) also state the CTC of Midleton WWTP is 1200 kg/d of BOD. We do not feel that it is reasonable to assume that a plant designed to treat 600 kg/d can be expected to adequately treat 1200 kg/d. A summary of the operational reports has been undertaken and shows that the plant regularly treats loads in excess of its design load whilst still be able to achieve its final effluent standards. Loads of up to 2756 Kg/Day of BOD have been received at the plant whilst still achieving its final effluent quality. Therefore a current treatment capacity of 1200kg/d of BOD has been demonstrated as achievable by the current plant infrastructure.

13) Volume 1 Schedules and Terms of Payment 3.5 state the BOD CTC (120 kg/d) is to be 200% of current design. We do not feel that it is reasonable to assume that a plant designed to treat 60 kg/d can be expected to adequately treat 120 kg/d. Especially in the light of the summary of results in Volume 2 Description of the Works Section 1.3.4 Table 1.2 show 7 months of the 15 illustrated with maximum effluent concentrations in excess of the standard of BOD 20 mg/l, COD 125 mg/l and SS 35 mg/l as detailed in Section 1.3.4. The plant has demonstrated that it can treat flow up to the specified treatment capacity within this period there has been a number of load in excess of the 120Kg/d BOD and these attribute to two of the failures taking these into account the allowable deviations no financial penalties would have resulted over the period. The Liaison Monitoring Committee will continually monitor these Current Treatment Capacities and if they are deemed to onerous they will be amended accordingly.

14) Volume 1 Clause 3.3.9 Storm Water Handling Facilities. Can we receive confirmation that these penalties are only incurred where an overflow event occurs through the fault of the Service Provider, and not when an overflow occurs. The minimum penalty specified is €1,500.00 for each day which will be far in excess of the daily fixed and variable charge for a pumping station which is also stated to be the penalty payable for premature overflow. The €1,500.00 seems expensive, can

you confirm which penalty takes precedence. Confirm that these penalties are only when an overflow event occurs through the fault of the Service Provider is by failure of the pumping station or not emptying the storm tank in an expeditious manner after a storm has ceased. As stated the minimum penalty is €1500 for each day the incident occurs.

15) Volume 1 Clause 3.3.11 Environmental nuisances Odour and noise nuisances will incur 20% of the fixed time charges for each day. However, it is also stated that there is a minimum fine of €5,000.00 for each day. €5,000.00 each occurrence is very harsh. Can the client please clarify what penalties are payable for this non conformance. As stated the penalty will be either 20% of the fixed time charges for each day subject to a minimum fine of €5,000 for each day.

16) Volume 1 Clause 3.3.12 Failure to provide information - The document states 10% of the fixed charge is deductible for the each day information is missing, but it also says the minimum penalty is €1,500.00 for each day. A penalty of €1,500.00 for a missing data point seems high. Can the client confirm which of the penalties is payable. As stated the penalty will be either 20% of the fixed time charges for each day subject to a minimum fine of €1500 for each day.

17) Volume 2 Clause 1.3.4 gives the minimum CTC for BOD for Killeagh to be 6% of design. We feel that a minimum at this level will cause underloading problems with consequential deterioration in effluent quality. The plant has demonstrated as can be seen in the operational reports that during low it can still achieve its final effluent quality standard.

18) Volume 1 Clause 3.3.10 Failure to Achieve the specified Treated Effluent Standard The document states that where BOD, TP and TN exceed performance standard by 100% and SS by 150%, then 4 weeks fixed and variable charges are deducted. We consider this to be an excessive penalty. This penalty will incur an 8.3% deduction of annual turnover, representing a prohibitively large proportion of margin a service provider would hope to gain on the contract. Can the client consider reviewing this penalty. This penalty is standard to DBO Contracts and has been included in a number of DBO Contracts and helps to ensure that there are no gross exceedance of standards by the Service Provider.

19) Volume 1 Clause 3.4 States that the service provider will not be paid for removal of BOD, P and N below that necessary to achieve the performance standard. We believe this does not encourage best practice and reward good environmental performance and is not ultimately in the spirit of the contract. We would respectfully ask the client to reconsider and pay the service provider for whatever BOD, TP and TN is removed through their operation. The Contract has been written in accordance with the standard documentation issued by the DOE and this clause is standard on all DBO Contracts and will not be changed.

20) Midleton sludges currently go to Rossmore Landfill. We understand that Rossmore is to close sometime in 2006. The new facility at Bottlehill will not be accepting sewage sludges. Therefore the only remaining facility in County Cork is Youghal Landfill. Should the contractors ignore pricing transport to Rossmore and only price the transport to Youghal. The pricing schedule is split into the transportation cost of transporting the dewatered sludge to its final desination and also an extra over cost for disposal to landfill. Therefore when Rossmore Landfill closes then sludge that cannot go to the hub center will be transport to Youghal for disposal. The Service Provider will be paid the appropriate rate per Km to transport the sludge to this landfill site, and the rate per tonne for disposal to landfill.

21) Volume 1 Schedules and Terms of Payment 3.5 state the total phosphorous consent for Midleton to be 2 mg/This is currently being achieved because of the dilution factor seen at Midleton. However, if the infiltration was resolved there would almost certainly be a requirement for chemical P removal which could not be costed at this point. This will be continually reviewed by the Liaison Monitoring Committee especially during the proposed works in the catchment to reduce infiltration. If after this work is completed it is evident that that works cannot achieve its P removal limit, then capital works will be procured outside of this Contract for the installation of a P dosing system in order that the work can achieve its Phosphorous limit.

22) Volume 2 Section 1.3.5, Table 2.3 show Castlemartyr being outside of consent on 4 of the 15 months where the results are summarised. In actual fact May 05 show an average greater than the maximum which would then indicate 5 of the 15 months out of compliance. However it is stated that the plant can meet its standards. These results show the plant is capable but fails at a certain frequency for whatever reason. We would ask what conditions are causing the plant to fail. From the operational reports it can be seen that the plant receives flows and loads less than the design capacity. In order to overcome this problem molasses is being added to the aeration tank in order to increase the BOD load going onto the plant.

23) Please forward as built drawings for all sites – see clause 1.4.2 of Volume 2 - It should be noted that the drawings are the best information available at the time of this tender. It is up to the Service Provider to satisfy himself what assets are on the sites as the drawings may not be a true record of what is actually on site.

24) Is there a problem with infiltration by sea water on any of the sites? Only known issue is at Rathcoursey tank as stated in Clause 2.8 of Volume 2 that the penstock seal may be leaking and may require re-sealing.

25) We note that Clause 1.7 provides for one weeks access on to the operational sites. Please confirm that if during the tendering period issues arise and we require additional access that we will get permission to re-visit the sites. Yes you will be able to visit the sites, however please see notes 26 and 27 for final communication periods.

26) Please confirm there are no outstanding issues with third parties in relation to these plants? As stated in the pre-qualification document that Cork County Council wish to inform potential applicants that there is a current legal dispute pending between Cork County Council and Atlantic Shellfish Ltd., over water quality in Cork Harbour.

27) We note that Dwyer Road Pumping Station has not yet been constructed. It is not possible to economically price the operation of this plant without additional details of the proposed plant. Please forward details of the proposed pump duty, size and details of any ancillary equipment. The detail design has not been undertaken for this pumping station at present all know details have been included within the Contract Document. Tenderers are requested to give prices based on the current information given.

28) We note you have included, copies of the EIS and plant licenses. Please confirm that the plants were designed and built to comply fully with the EIS. Please confirm also that there are sufficient licenses in place to allow operation and maintenance of the plants. With regards to licenses see clause 4.25 of Volume 1. All licenses were requested from Cork County Council and copies of all licenses received are contain in Volume 3 of the Contract Document. With regards to whether the plant

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has been design and built to comply with the EIS. During the tender period the tenderers are to undertake their own assessment of the condition of the existing infrastructure to be be handed over to the Service Provider as part of this Contract both in terms of condition and in compliance to the EIS and current H&S legislation.

29) Please confirm that all existing overflows are operational and are licensed. All existing overflows are operational with regards to licenses see note 28.

30) Please provide details of the existing SCADA systems. Please confirm that we have permission to examine the historical data on the SCADA systems during the site visits. Current there is only one SCADA system at Midleton WWTP this will be made available for inspection and data acquisition as required. The O&M manuals detailing the SCADA system will also be made available during the site visits.

31) Please confirm that none of the sites are subjected to flooding? This has been passed to the current operators and also Cork County Council for conformation.

32) Please confirm that the reed beds have not "bound" in the past, resulting in ponding and other issues? This has been passed to the current operators and also Cork County Council for conformation.

33) We request that the make and model of all plant items are forward. Detailed asset information including the O&M manuals will be made available during the site visits.

34) Please forward process design calculations and mechanical and electrical design details for all plants. Copies of the O&M manual for the Midleton Plant will be made available during the site visit. With regards to Killeagh, Cloyne and Castlemartyr we have provided in Volume 3 all data received from Cork County Council.

35) Please forward detailed expenditure schedules for all sites. Forward to current operators and Cork County Council.

Contract Amendments:-

36) Volume 1 Clause 1.6 Notice from Employer – Up to 7 working days prior to the latest date for receipt of tenders stated in Instruction 1.17(a) below the Employer's Representative acting on behalf of the Employer may issue a Notice by registered post to all persons or firms who have received the Tender documents, deleting, varying or extending any item in or adding any items to these documents. Any such Notice shall then form part of the Tender documents and shall be treated as such by the Tenderer. Page 3 of Volume 1 has been amended to reflect this change.

37) Volume 1 Clause 1.7 Communications – Queries will be accepted with 10 working days prior to the latest date for the receipt of tenders. Page 4 of Volume 1 has been amended to reflect this change.

38) Volume 1 Clause 3.3.10 Failure to Achieve the Specified Treated Effluent Standard – BOD, TP and TN the following has been added BOD, TP and TN – Midleton WWTP and BOD, SS and COD – Killeagh, Cloyne and Castlemartyr WWTP. The table for penalties has also been amended for 16th – 52 non-compliant samples should be 2 weeks variable treatment charges. Suspended Solids has been replaced with SS and COD Midleton WWTP and the table has been amended to 19th non compliant sample and 20th to 156 non-compliant sample and tables A6, A7, A9 and B6, B7, B9 have been removed accordingly. Pages 48 and 49 of Volume 1 has been amended to reflect these changes.

39) Volume 1 Clause 3.5 Table A6 & Clause 3.6 Table B6 – Schedule of Payments – Killeaqh WWTP – The BOD limit should be 20mg/l. Pages 58 and 81 of Volume 1 has been amended to reflect these changes.

40) Volume 1 Clause 3.5 Table A9 & Clause 3.6 Table B9 – Schedule of Payments – Cloyne WWTP – The BOD load should be 140Kg/d. Pages 60 and 83 of Volume 1 and 21 and 48 of Volume 2 has been amended to reflect these changes. It has been demonstrated by the plant that it can treat loads up to 140Kg/d BOD whilst still achieving its consent parameters.

41) Volume 1 Clause 3.5 Table A10 & Clause 3.6 Table B10 – Schedule of Payments – Sludge Treatment and Transportation – Transportation of sludge has been divided into three categories. Pages 61,62, 84 and 85 has been amended to reflect these changes.

42) Volume 1 Clause 3.3.8 Failure to Provide the Specified Pumping Capacity – Penalty has been changed in that it will only apply if as a result of the pumping capacity being unavailable it result in unnecessary storm pumping, emergency overflows operating or flooding within the upstream catchment. Page 46 of Volume 1 has been amended to reflect this change.

43) Volume 2 Clause 3.3.2 Sampling – The collection and issuing of samples once a month to an independent laboratory for analysis. Page 35 of Volume 2 has been amended to reflect this change.

44) Volume 2 Clause 3.4.3 Midleton WWTP – Process Requirements – Daily sampling for COD, SS, pH, NH3 means 5 Days per Week. Also the following sentence has been added - The Collection and issuing of samples for pH, BOD, COD, SS, TN-N, TP-P, Total Coliforms once a month to an independent laboratory for analysis (Note:-The Service Provider is to include the costs of undertaking this independent analysis within his unit rates). Pages 39 and 40 of Volume 2 have been amended to reflect these changes.

45) Volume 2 Clause 3.5.3 Killeagh WWTP – Process Requirements – The following sentence has been added - The Collection and issuing of samples for pH, BOD, COD, SS, TP-P, once a month to an independent laboratory for analysis (Note:-The Service Provider is to include the costs of undertaking this independent analysis within his unit rates). Page 43 of Volume 2 has been amended to reflect these changes.

46) Volume 2 Clause 3.6.3 Castlemartyr WWTP – Process Requirements – The following sentence has been added - The Collection and issuing of samples for pH, BOD, COD, SS, TP-P, once a month to an independent laboratory for analysis (Note:-The Service Provider is to include the costs of undertaking this independent analysis within his unit rates). Page 46 of Volume 2 has been amended to reflect these changes.

47) Volume 2 Clause 3.6.3 Cloyne WWTP – Process Requirements – The following sentence has been added - The Collection and issuing of samples for pH, BOD, COD, SS, TP-P, once a month to an independent laboratory for analysis (Note:-The Service Provider is to include the costs of undertaking this independent analysis within his unit rates). Page 49 of Volume 2 has been amended to reflect these changes.

48) Can the volumes pumped from Ballinacurra PS to Rathcoursey outfall be provided (i.e. industrial and domestic). Can you also confirm that the pumps pumping sewage from Ballinacurra 2 to Bailick 3 and eventually onto Bailick 2 are fed from the supply currently metering Ballinacurra. If so, the power expended here cannot be recovered as there is no rate for the pumping of this wastewater. Passed to Cork County Council to provide this additional information. An additional item has been added into tables A13/1 and B13/1 to provide an electricity meter on the feed to Ballinacurra No. 2 control panel. Clause 3.12.4 of page 59 of Volume 2 has also

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125 l/s = 10,800 m³/d
= 4.8 DWF

been amended to detail the payment mechanism before and after the installation of the electricity meter. Information on the pumped flows has been requested from Cork County Council.

49) The documents (Volume 1 Schedule 3.5) state the Current Treatment Capacity (CTC) for Midleton to be 125 l/s. We are not aware of the plant ever operating at 125 l/s and suspect this volumetric throughput will exert excessive pressure on the system with adverse consequences in the effluent quality. Therefore we of the opinion that a CTC of 125 l/s is excessive. A summary of the operational reports has been undertaken and shows that the plant has previously treated regularly treats flows in excess of its design flow whilst still be able to achieve its final effluent standards. The maximum flow received to the plant is 119l/s whilst still achieving its final effluent quality the CTC has been amended to this figure on pages 52, 75 of Volume 1 and pages 14, 38 of Volume 2 It should be noted that the CTC will be continually assessed by the Liaison Monitoring Committee throughout the 10 year operating period and if it is deemed that the current CTC is to onerous on the Service Provider then it will be reviewed and amended accordingly. *

Could you please sign and date the attached conformation letter and return it to me at the above office. Note copies of the signed confirmation should be included within your tender submission.

Yours sincerely,

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

119 l/s = 10,282 m³/d
1 DWF = 2256 m³/d
Thus = 4.6 DWF

Encl
Volume 1 Revision of the following pages:- 3, 4, 46, 48, 49, 52, 58, 60, 61, 62, 64, 75, 81, 83, 84, 85, 87

Volume 2 Revision of the following Pages:- 14, 21, 35, 38, 39, 40, 43, 46, 48, 49 and 59

EPS – Pumping and Treatment Systems
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J. B. Barry & Partners Ltd,
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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	
Maximum Instantaneous Flow	l/s	90	
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	

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max. flow
@ 3248 m³ 1DWF = 2256m³

Note

NB!

*:- 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?

For 900kg EIS is for 15,000PE & needs 3 streams

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.

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., Technology 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

(3)

BARRY & PARTNERS
consulting engineers

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MINUTES OF MEETING

Project:	Midleton, Killeagh, Cloyne, Castlemartyr, O+M Contract	Date:	06.03.06
Location:	JB Barry & Partners, Technology House, Wallingstown	Time:	10.30 am
Prepared By:	Mr. Maurice O'Donoghue, J B Barry & Partners	File Ref.:	
Present:	Mr Noel O'Keefe, Cork County Council Mr Richard Kent, J B Barry & Partners Mr Maurice O'Donoghue, J B Barry & Partners Mr Tom Ruddy, EPS Mr Barry O'Toole, EPS Mr Noel Hanley, Response Engineering Mr Sean Murphy, Response Engineering Mr Sean Ryle, Earth Tech		
Apologies:			
c.c.	All Present Niall McDermott, J B Barry & Partners		

Item	Description	Action
1.	**Introduction** NO'K explained the background to the meeting. All Tenderers had expressed concern that the requirement of the documents to seek Treatment Plants to handle through – flows greater than original capacities, while imposing penalties for non compliance with specified performance standards was an unrealistic demand. The purpose of the meeting was to seek a solution whereby all parties would agree to a sustainable treatment capacity, and penalty mechanism balance. The agreement of all Tenderers to accept a compromise employer's requirement would be necessary.	
2.	**Existing Plant Date/Non Compliance Events** RK handed out tabulated data for years 2004 & 2005 for all 4 No plants. RK went through the data presented and commented on any justifications, one-off events, influent profile alterations known. Non Compliance figures with (i) Existing Standards and (ii) Proposed were highlighted. SR queried frequency of sampling currently undertaken. RK	

Item	Description	Action
	confirmed weekly at all sites, and more frequent at Midleton.	
3.	**Tenderer Comments** TR stated that excedances were almost exclusively due to hydraulic demands placed on each plant – particularly Midleton TW's – where EPS had specific knowledge. TR gave examples of flow values and durations. NH agreed with RG assessments. TR stated to properly analyse ultimate sustainable hydraulic capacity of plants, each tender would require detailed initial design date on all elements of existing plants. (PE figures alone insufficient, breakdown of DWF required) Tenderers require details of max instantaneous daily flow, capacity of plant also dependant on sludge handling capacity and volumetric capacity of basins. JBB to obtain data from Cork County Council and existing operators by 10/03/06 and circulate to all Tenderers by 13/03/06. (Killeagh information to be obtained from John Molloy Engineering) Cloyne data expressed – after reed bed treatment. Data also available after clarifier (already in tender documents) JBB's to check some unit designations in documents. JBB's to check Killeagh throughput – 2298m³/day? TR restated limitations on upsizing Midleton Plant. Tanks have 20% anoxic capacity for denitrification purposes. Sustained flows over 90 l/s (greater than 8 hours) will wash out mixed liquor, and cause failures of treatment standards. Prelim analysis suggest 105l/s (for a 20 minute duration) to protect plant operation. NOK agreed overflow incidents more defensible than inadequate treatment or plant – downtime. NOK stated measure were in hand to tackle the infiltration difficulties at Middleton. NOK outlined future strategy to upsize all plants to match ongoing population growth in the immediate term. Approval for capital expenditure is often a slow process and DBO procurement process not likely to be achieved within 5 years. Cork County Council seeking best value for money from existing assets and best performance in the intervening period.	✓ we too **EPS / RESPONSE/ JBB** we do need this **JBB** ✗ 7776 m³/d (3DWF) this is unbelievable NB. Signs for DBO
4.	**Other Queries Raised** Why has sludge yield increased at Midleton WWTP? TR/BOT link to hydraulic difficulties. Average sludge age 8 days vs 30 days.	NB

Item	Description	Action
	Why are power consumption figures up at Midleton WWTP? Air blowers were not fully functioning at all times – now resolved.	
	Latent defects – Earth Tech querying how these can be priced? RK referred to C.R.F. Tenderers ask that JBB specify CRF values for all 4 No plants to ensure an even playing field. MOD stated that contractor "expertise" in assessing existing plant was being lost to client by providing PC Sums. It was agreed that PC Sums will be provide by JBB for the capital replacement Fund.	**JBB**
	SR requested a detail breakdown of the Scoring systems for technical evaluation process. JBB to forward detailed break down.	**JBB**
	Health & Safety – S.R seeking P.C sums for even playing field. MOD referred to prelim H& S Plan's forwarded. MOD proposed JBB would put forward sums for each plant, but contactor would have adjustment item, in order to remove risk from client. TR queried use of Project Supervisor (DS) for O+M contract. RK/NO'K clarified that risk was in relation to new design inputs only.	**JBB**
	Sludge Transport costs queried – JBB's to forward figures acquired from current operator for Killeagh, Castlemartyr and Cloyne.	**Response/JBB**
	Pump Stations – current blockage incidents. S.R queried how this was being dealt with. RK stated that history of blockage incidents was included in the documents for Midleton, and NH is to forward details to RK for the pumping station on the Killeagh WWTP, which frequently becomes blocked. Tenderers will be expected to take this matter into account.	**Response/JBB** Need ?
	SR asked how the PS at Dwyers Road was to be priced with limited information. It was agreed with NO'K that this item would be deleted from the document and subject to future negotiation (based on rates for the other PS in the document) once the PS had been constructed and commissioned.	**JBB**
	Insurances – NO'K confirmed that Cork County Council would carry general insurance of the works. Operator to provide EL and PL as per documents requirements.	
	Odour and Noise matters. NH stated that the current requirements appear excessive. JBB's to check E.I.S commitments/conditions. It was agreed that Tenderers to supply rate for basic odour and noise recording at site boundaries at Contract Commencement and then as requested by Cork County Council.	**JBB**

Item	Description	Action
5.	**Conclusions** Tender return date now extended to 7th April 2005. Final date for further enquiries set at 24th March 2005. NO'K asked that no further delays occur in bring the tender process to a conclusion. NO'K referred to other works currently at Tender stage and future opportunities to Tenderers. TR stated the meeting was a most useful exchange of views. All present offered full co-operation with Cork County Council and Consultants and each other, and agreed to commit to the consensus approach strategy requested by NO'K. NO'K ended the meeting	2006 **JBB**
	End of Meeting	

Midleton Sewerage Scheme : Results of Cork CC bacteriological sampling

(Cork County Council)

	B1 + B2		Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
Date	Overflow	Influent	Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
	next a.m.	(EPS reports)								
		i.e. next day								
28.06.00				7,300	1					
04.07.00			8,800,000	11,800	10				12,000	12,000
11.07.00		3,489	4,200,000	8,900	2				unreliable	unreliable
18.07.00		2,970	9,500,000	<12000	1					unreliable
25.07.00		2,517	80,000	40,000	1				28,000	28,000
01.08.00		4,105	19,000,000	44,000	24				55,000	55,000
08.08.00		3,254	9,066,667	1,000	1					
15.08.00		2,891	4,000,000	37,000	390					
22.08.00		2,008	8,200,000	30,000	1				70,000	70,000
30.08.00		2,806	11,850,000	50,000	20					
05.09.00		2,237	2,600,000	30,000	20					
12.09.00		2,322	11,000,000	460,000	20				120,000	
20.09.00		2,511	5,700,000	10,000	14					
26.09.00		3,095	2,000,000	10,000	20				80,000	
04.10.00		4,136	2,300,000		20				30,000	
11.10.00	2.3hrs	2,171	1,000,000	7,000	2				32,000	
18.10.00	2.5hrs	4,613	2,400,000	16,000	8				39,000	
24.10.00		3,966	1,000,000	120,000	1				14,000	
31.10.00		4,562	1,180,000	17,000	7				93,000	
07.11.00	8.5hrs	3,818	810,000	6,000	37				24,000	
15.11.00	2.0hrs	4,213	2,500,000	27,000	1				28,000	
21.11.00	6.5hrs	3,845	2,150,000	470,000	5				75,000	
29.11.00	1.0hrs	3,741	1,060,000	11,000	25				20,000	
05.12.00		3,654	1,000,000	13,000	3				41,000	
12.12.00	24.0hrs	3,711	90,000	20,000	8				43,000	
03.01.01		5,530	810,000	25,000	30				28,000	
09.01.01		5,467	520,000	33,000	140				17,000	
16.01.01		4,721	1,400,000	28,000	7				25,000	
24.01.01	2.0hrs	6,187	320,000	28,000	90				10,000	
30.01.01		4,745	2,300,000	9,000	1				50,000	
08.02.01		5,044	290,000	6,000	4		Figures in blue are		47,000	
13.02.01		5,622	970,000	5,000	1		days when Irish		14,000	
20.02.01		4,288	510,000	7,000	2		Distillers Ltd. were		16,000	
28.02.01		4,752	1,080,000	3,000	3		not discharging		53,000	
07.03.01	8.0hrs	4,534	960,000	5,000	3				86,000	
14.03.01		5,102	900,000	20,000	10				8,000	

(A)

	B1 + B2		Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
Date	Overflow	Influent	Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
21.03.01		5,110	500,000	80,000	27				36,000	
27.03.01		4,874	4,000,000	100,000	27		47,000		2,000	
05.04.01		4,008	1,000,000		6		130,000		61,000	
09.04.01		4,924	1,100,000	2,000	2		70,000		28,000	
18.04.01		4,697	180,000	90,000	2		2,640,000		7,000	
25.04.01		2,015	3,200,000	350,000	230		10,000		22,000	
02.05.01		5,412	2,000,000	230,000	10		180,000		32,000	
09.05.01		6,018	4,300,000	38,000	2		290,000		15,000	
15.05.01		5,821	1,660,000		3				20,000	
22.05.01		4,114	2,900,000	30,000	4		90,000		30,000	
28.05.01		4,675	2,100,000	64,000	5		160,000		50,000	
05.06.01		4,744	3,800,000	50,000	23					
11.06.01		4,787	700,000	11,199	155				6,131	2,400
18.06.01		5,406	3,400,000	3,000	23		20,000		2,500	1
25.06.01		5,245	22,000,000	6,000	290				110,000	6,500
02.07.01		4,722	13,300,000	39,500	31		10,000		1	1
09.07.01		4,647	2,300,000	17,500	4				10,000	
17.07.01		6,926	700,000	33,000	1		**10,000**		11,000	
23.07.01		5,010	190,000	41,000	13		**10,000**		2,000	
31.07.01		4,085	3,300,000	26,000	3		**30,000**		5,000	
07.08.01		4,897	1,000,000	5,000	800		**20,000**		5,000	50,000
13.08.01		5,419	1,500,000	17,000	84		**50,000**		3,000	4,000
21.08.01		8,811	4,000,000	40,000	2		6,000		1,000	1
28.08.01		5,177	5,500,000	69,000	3		40,000		9,000	40,000
11.09.01		3,457	14,000,000	30,000	7		**20,000**		8,000	20,000
18.09.01		5,856					**55,000**		8,000	7,000
26.09.01		4,687					80,000		20,000	30,000
01.10.01		4,818	650,000	50,000	6		20,000		6,000	8,000
10.10.01		4,645	2,500,000	12,000	30		**125,000**		70,000	45,000
15.10.01		6,152	4,200,000	57,000	24		10,000		13,500	2,000
24.10.01		6,985	2,400,000	53,000	3		20,000		30,000	15,000
30.10.01		5,820	480,000	370,000	129		21,000		2,000	1,000
06.11.01		6,740	2,800,000	130,000	700		660,000	350,000	86,000	240,000
12.11.01		5,494	220,000	34,000	41		10,000		20,000	20,000
20.11.01		4,617	3,500,000	250,000	62		1,000		10,000	10,000
29.11.01		5,786	2,000,000	73,000	104				2,500	10,000
04.12.01	1,346	7,554	8,100,000	28,000	9		78,000	9,000,000	4,000	5,500
11.12.01		5,320	170,000	39,000	500		**1**		4,000	5,000
07.01.02		6,344	520,000	6,000	12		**10,000**		10,000	5,000
15.01.02		6,105	1,800,000	3,500	6					
22.01.02	5,782	6,484	680,000	8,000	15		1,000	150,000	1,000	1,000

Date	B1 + B2 Overflow	Influent	Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
			Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
29.01.02	2,435	7,855	2,840,000	1,600,000	80		1,000	900,000	200	10,000
06.02.02	4,594	8,026	625,000	3,000	1		1	140,000		
11.02.02	2,495	7,535	800,000	9,000	5		70,000	120,000	2,400	610
18.02.02	653	7,138	1,200,000	9,000	11		10,000	390,000	20,000	10,000
28.02.02	4,078	6,511	1,020,000	45,000	90		24,000	375,000	7,000	
06.03.02		7,193	5,100,000	7,000	4		36,000	430,000	10,000	1,000
13.03.02		6,749	2,400,000	55,000	17,000		17,000	56,000	21,000	20,000
19.03.02		8,133	2,750,000	8,000	2		1	740,000	10,000	1
25.03.02		6,343	3,500,000	220,000	44		7,000		2,000	
03.04.02		7,136	1,390,000	20,000	17		4,000		1,000	2,000
09.04.02	166	5,826	3,200,000	1,000	30		1,000		1,000	
16.04.02		6,696	4,350,000	2,000	1		7,000		4,000	8,000
23.04.02		6,612	2,900,000	30,000	18		2,000		1,000	1,000
01.05.02		7,192	2,300,000	4,000	5		10,000		10,000	10,000
07.05.02		5,822	4,500,000	54,000	1		10,000		1,000	
14.05.02		6,845	3,300,000	3,000	17		30,000	610,000	1,000	2,000
20.05.02	198	7,260	895,000	1,000	5		20,000	340,000	17,500	10,000
29.05.02	2,039	7,325	5,700,000	2,000	2		1,000	930,000	1,000	1,000
06.06.02		7,121	3,700,000	1,000	19		5,000	20,000	3,000	1,000
11.06.02		7,171	290,000	1,000	0		**20,000**	400,000	10,000	
17.06.02	178	6,595	10,000	2,000	1		30,000	755,000	5,000	
25.06.02		6,868	6,050,000	15,500	17		36,500	10,000	8,000	
03.07.02		6,568	1,653,333	40,000	11		5,500		4,000	6,000
09.07.02		7,141	1,500,000	5,500	1		5,000		2,000	1,000
16.07.02		5,782	2,600,000	6,000	35		**10,000**		1,000	1,000
24.07.02		5,609	6,750,000	8,000	2,600		**34,500**		2,000	
29.07.02		5,758	7,350,000	17,500	12		**27,000**		1,000	2,000
06.08.02		5,690	10,150,000	6,000	24		16,000		1,000	8,000
15.08.02		5,537	5,300,000	24,000	9		10,000		20,000	20,000
21.08.02		5,158	800,000	9,000	10		40,000		8,500	5,000
26.08.02		5,106	6,200,000	25,000	15					
03.09.02		4,503	4,550,000	42,000	88		14,500		2,000	
10.09.02		6,748	4,500,000	104,500	221		107,334		6,000	14,000
16.09.02		5,229	2,550,000	3,000	11		864		124	296
24.09.02		4,854	7,100,000	20,000	11		250,000		10,000	10,000
03.10.02		4,314	7,450,000	30,500	36		108,500		7,500	15,500
09.10.02	1,010	9,325	2,500,000	240,000	24		11,000		4,000	4,000
16.10.02		4,428	1,700,000	15,500	5					
22.10.02		8,548	720,000	5,500	1		7,500	1,420,000	1,000	3,000
30.10.02	1,921	6,634	4,100,000	4,000	1		47,000	300,000	64,000	32,000
06.11.02	1,764	7,813	1,763,333	2,000	6		280,000	875,000	32,667	5,500

	B1 + B2		Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
Date	Overflow	Influent	Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
12.11.02	688	7,408	2,200,000	5,000	6		10,000	444,000	20,000	10,000
20.11.02	7,745	9,402	1,700,000	7,000	1		70,000	120,000	2,000	
26.11.02	6,244	7,772	760,000	4,000	2		70,000	200,000	10,000	10,000
04.12.02	1,759	7,784	1,373,333	6,500	9		60,000	4,150,000	13,000	
10.12.02	832	7,494	953,333	7,000	5		50,000	420,000	2,000	2,000
18.12.02	2,645	6,551	2,400,000	21,000	11		1	270,000	1	
02.01.03	3,692	7,479	3,500,000	12,500	1		11,500	120,000	5,500	
08.01.03	1,427	7,763	1,350,000	3,000	1		90,000		1,000	3,000
16.01.03	2,198	7,590	2,726,667	22,500	20		100		1,500	
21.01.03	1,586	7,666	65,000	14,000	9		1,000		1,000	1,000
29.01.03	99	7,391	4,200,000	16,500	8		275		63	
05.02.03		7,141	5,800,000	13,000	5		550		200,000	300
12.02.03		7,734	2,800,000	12,000	4		19		45	162
19.02.03		7,555	1,013,000	13,000	10		20		70	500
26.02.03		7,138	765,000	12,000	2		630		40	400
05.03.03	198	7,635	2,146,500	1,000	1		156		40	
11.03.03		7,245	1,513,000	94,000	5		100		10	1
19.03.03		7,427	950,000	22,000	2		500		90	
25.03.03		7,282	2,490,000	47,000	41		335		115	620
02.04.03		6,648	2,976,000	55,000	16		1		20	
09.04.03		5,793	1,623,000	7,000	9		50		10	60
15.04.03		7,242	1,250,000	1,000	30		50	265,000	570,000	1,215
22.04.03		5,220	1,780,000	1,000	12		617		100	100
30.04.03	158	7,636	2,500,000	5,000	6		60	260,000		
08.05.03	40	7,051	3,507,000	60	461		3,037		450	
15.05.03	267	7,638	1,087,500	8,400	8		480	1	120	
20.05.03		7,473	1,175,000	8,733	3		20		115	160
26.05.03		6,518	90,000	1,000	2				1	
05.06.03	40	7,418	5,300,000	1	1		1,044	21,500	87	360
10.06.03	3,386	7,761	1,500,000	1,300	10		3,700		300	3,200
18.06.03	218	7,255	1,170,000	3,000	54		1	440,000	1	1
25.06.03		6,781	132,000,000	57,000	1,315		1		205	3,500
01.07.03	40	7,463	3,600,000	14,000	3		76	870,000	1,080	750
07.07.03		6,328	3,475,000	8,000	12				30	180
15.07.03		6,560	4,400,000	18,500	18		1,700		200	300
23.07.03		5,609	3,550,000	27,500	152		3,300		135	236
30.07.03		6,031	2,100,000	11,650	6		737		1,550	
06.08.03		5,659	5,670,000	79,000	1		2,350		100	2,300
12.08.03		6,114	13,400,000	23,500	170		1,160		1,160	
19.08.03		5,124	2,200,000	10,000	11		1		1,000	3,000
26.08.03		6,273	5,366,667	73,500	14		1,070		155	

	B1 + B2		Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
Date	Overflow	Influent	Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
03.09.03		5,416	3,850,000	33,000	10		10,000		290	100
10.09.03		4,877	5,450,000	16,000	25		29,090		4,700	2,200
16.09.03		4,609	3,300,000	2,000	5		1,000		1,000	1,000
23.09.03		4,747	4,700,000	20,000	10		2,000		98,000	
01.10.03		4,402	4,000,000	42,000	55		1,250		65,000	15,000
07.10.03		4,193	7,650,000	29,500	49		63,500		340,000	4,000
13.10.03		4,551	12,100,000	58,000	450		13,000		2,000	3,000
21.10.03		4,045	2,800,000	22,000	18		533,333		38,500	
29.10.03		5,264	3,600,000	92,000	16				13,500	22,500
04.11.03		4,412	2,033,333	44,000	6		80,000		10,000	10,000
12.11.03		5,361	5,270,000	42,000	18		710,000	986,666	5,000	11,000
26.11.03		6,451	1,700,000	17,500	14		10,000	200,000	1,000	
02.12.03		6,035	1,750,000	20,000	6		10,000		1,000	1,000
11.12.03		6,153	6,566,666	28,333	90		5,000		740	100
16.12.03		5,377	510,000	7,000	5		10,000		100	300
22.12.03	119	4,009	2,300,000	18,000	26		10,000	400,000	100	
08.01.04	139	7,487	204,000	11,500	28		1,000	733,000	1,000	1,000
14.01.04	832	7,264	1,803,333	8,000	4		1,000		5,500	1,000
22.01.04	2,099	6,820	330,000	10,000	5		2,000	403,333	240,000	117,333
27.01.04	1,049	7,131	1,755,000	12,000	4		60,000		22,000	1,000
05.02.04	2,653	7,762	1,800,000	8,500	10		1,000	800,000	750	
12.02.04	1,327	7,351	3,600,000	10,000	30		20,000		800	800
18.02.04		7,256	2,500,000	9,000	1		3,000	703,933	100	600
25.02.04	257	6,500	2,500,000	10,500	4		100,000		10,000	10,000
04.03.04		6,417	1,500,000	29,500	13			1,100,000	2,000	1,000
10.03.04		6,470	1,680,000	69,000	70		1,000		1,000	1,000
18.03.04	4,851	5,669	1,074,000	150,000	60		1,000	1,300,000	1,000	
24.03.04	40	7,282	3,050,000	19,000	9		10,000		1,000	1,000
30.03.04		6,379	1,000,000	23,000	18		10,000	200,000	1,000	1,000
07.04.04		6,824	1,000,000	18,000	7		4,000		100	100
14.04.04		6,539	1,500,000	19,000	5		1,000		285	
21.04.04	317	7,215	2,470,000	50,000	7		600		100	100
28.04.04		5,886	2,400,000	263,333	30		4,000	112	165	8
06.05.04		6,511	1,900,000	68,300			500		220	290
13.05.04		5,564	1,700,000	31,300	53		90		120	
19.05.04		5,368	1,650,000	27,000	24		3,400		150	
26.05.04		4,915	2,800,000	1,600	22		900		80	200
02.06.04		4,968	3,800,000	1,700	22		5,200		3,880	1,120
09.06.04		5,694	4,700,000	24,000	8		1,200		2,060	8,666
16.06.04		4,389	3,750,000	20,500	40		630		135	300

Date	B1 + B2 Overflow	Influent	Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
			Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
23.06.04		5,699	4,550,000	8,000	24		1,050		2,588	87
01.07.04		5,530		10,667	33		230		50	
08.07.04		4,242	5,700,000	12,500	12		935		75	100
19.07.04		4,192	2,750,000	820,000	100		10,000		1,000	
29.07.04		5,494	6,900,000	7,667	16				275	
04.08.04		4,570	995,000	40,333	13		4,050		115	120
08.09.04		5,084	4,500,000	430,000	56		3,100		200	
29.10.04		unreliable	6,200	0	0		0	0	0	0
04.11.04		unreliable	9,550	230	0		325	10,000	130	[illegible]
04.11.04		unreliable	1,100,000	460,000	<30		9,300	24,000	1,100	300
12.11.04		unreliable	8,200	350	0		0		0	[illegible]
18.11.04	245	6,125	1,100,000	29,000	<30		900			400
25.11.04	3,785	5,890	4,600,000	2,400,000	<30		4,800	240,000	24,000	9,300
02.12.04		5,917	1,500,000	30	<30		<30	30	30	30
10.12.04		6,326	11,000,000	11,000	<30		<30	700	30	
16.12.04		6,088	240,000	15,000	<30		400	400	30	
27.12.05		6,546	4,600,000	24,000	<30		9,300		400	
14.01.05	2,336	7,051	1,500,000	900	<30		30	30	29,000	
20.01.05	2,574	6,643	900,000	2,400	90		460	930,000	15	48
28.01.05		7,332	280,000	11,000	7		1,100	280	39	
03.02.05	277	5,454	240,000	24,000	9		300	110,000	48	
10.02.05	288	6,638	1,500,000	24,000	4		2,400	9	3	3
17.02.05		5,845	1,500,000	75,000	9		23		48	23
24.02.05		5,704	1,100,000	11,000	150			2,400		390
03.03.05		unreliable								
14.03.05		5,754	150,000	1,100	48		150	48	21	240
18.03.05		5,246	110,000	460	4		240	150	23	
24.03.05	1,348	5,892	120,000	15,000	3		460		93	240
01.04.05	40	6,668	3,000	3	3		3		3	3
07.04.05	1,168	5,503	150,000	11,000	3		1,100	1,100	390	
14.04.05	257	unreliable	2,000	1	20,000		400	24	1	
21.04.05	317	unreliable	11,000,000	100,000	10,000		3,000	100,000	1,000	
28.04.05	2,655	unreliable	6,000,000	69,000	100		9,800	100,000	6,000	[illegible]
05.05.05	1,406	unreliable	2,000,000	100,000	1,000		1,000	7,000,000	2,000	
19.05.05	1,089	6,590	5,200,000	100	1		23,000	100,000	2,000	1,300
26.05.05		7,566	5,840,000	40,000	10		5,800	6,240,000	1,000	8,200
02.06.05		6,173	1,040,000	17,000	80		100	1,000	100	
09.06.05		5,441	6,000,000	7,200	22,000	4,000	2,800		10	90
16.06.05		5,628	8,700,000	43,000	36	1	1		1	
20.06.05		5,337	13,600,000	32,000	1		120,000		1	
30.06.05	40	5,392	1	1	43	1	4,200		120	400

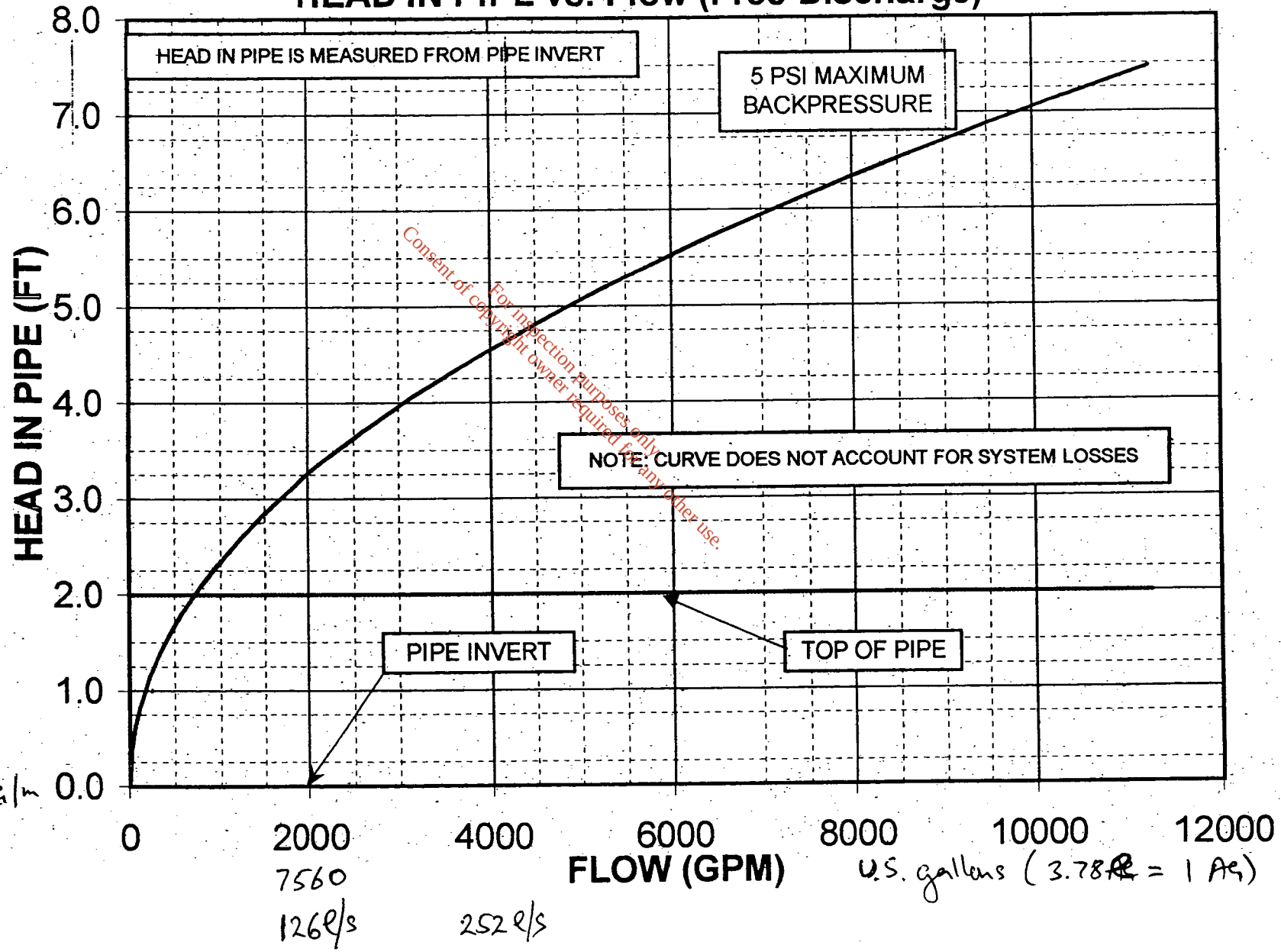
	B1 + B2		Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
Date	Overflow	Influent	Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
07.07.05		5,236	34,000,000	22,000	1	1	252,000		30,000	
14.07.05		4,969	12,240,000	100,900	1	84,000	620,000		102,400	200,000
21.07.05		4,989	55,200,000	66,000	1		2,300		900	
28.07.05		5,969	12,000,000	1	17,600	400,000	408,000		37,000	79,000
04.08.05		5,681	27,000,000	28,000	1		1		200,000	
11.08.05		5,545	68,000,000	1	1	1,600	420		1	1
18.08.05		Results invalidated by Microchem								
25.08.05	108	4,770	26,000,000	330,000	170	1	1,800		2,800	540
01.09.05		5,157	110,000,000	42,000	1		1,800		110	
08.09.05		6,152	24,000,000	4,000,000	80	200,000	5,600		2,300	900
15.09.05	22	4,516	1	400,000	1	5,000	400		1	
22.09.05	266	5,915	4,200,000	100	120	2,800	8,400		400	10
29.09.05		5,017	5,200,000	74,000	74	1	600		400	
06.10.05		4,683	2,200,000	328,000	600	1,000	820		500	10
13.10.05	43	4,440	540,000	304,000	170	1,000	720		82	
20.10.05	6,246	7,299	8,400,000	2,300,000	490	4,800	3,700	2,000,000	2,000	7,500
27.10.05	1,710	7,341	15,600,000	220,000	10	1,000	3,800	80,000	320	180
03.11.05	11,081	7,496	9,600,000	43,000	12	14,000	19,000	1,800,000	2,400	
10.11.05	2,369	7,445	2,900,000	54,000	10	1,000	1,000	5,800,000	1,100	100
17.11.05	1,694	7,363	3,300,000	110,000	20	1,000	3,800	4,800,000	420	
24.11.05	14	7,194	1,900,000	64,000	10	1,000	2,600	1,200,000	100	10
01.12.05	5,155	5,671	2,000,000	100,000	10	15,000	1,000	170,000	3,200	
08.12.05	367	7,262	2,400,000	20,000	10	100	200		300	
15.12.05	252	6,017	2,400,000	11,000	34	1,000	1,500		160	
05.01.06	1,184	6,039	3,400,000	52,000	20	3,600	660	9,400,000	800	260
12.01.06	1,134	6,422	2,600,000	16,000	24	1,000	1,300	4,800,000	290	
19.01.06	488	6,672	1,600,000	120,000	10	1,000	360		10	270
26.01.06		7,038	1,640,000	66,000	10	1,000	240		120	
02.02.06	209	7,150	1,000,000	64,000	20	1,000	1,000		100	100
09.02.06		5,897	5,100,000	100,000	20	1,000	100		10	
13.02.06	295	7,933	7,800,000	35,000	10	240	2,100		96	410
27.02.06	50	5,796	8,800	3,500	88	130	1,400		110	
09.03.06	108	5,397	3,000,000	40,000	26	3,200	600		300	
13.03.06	295	7,200	9,600,000	1,000	130	3,000	2,400		650	
23.03.06	223	6,789	2,700,000	8,800	17	1	360		260	340
27.03.06	952	8,139	1,800,000	5,200	1	2,000	4,400	96,000		
06.04.06	79	7,151	3,700,000	1,000	1	5,400	2,800	80,000	10	
10.04.06		7,054	9,200,000	200,000	90	1,800	3,100	130,000	490	
20.04.06	945	7,076	19,000,000	44,000	1	560	2,300	450,000	360	200
24.04.06		7,178	2,200,000	52,000	12	240	2,200	1,200,000	100	
04.05.06	331	6,186	3,600,000	14,400	88	100	6,400		440	10

Date	B1 + B2 Overflow	Influent	Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
			Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
08.05.06		7,010	2,600,000	1,000	10	3,200	1,000	1,000,000	460	
15.05.06	410	5,900	4,400,000	22,000	150	6,500	41,000		2,800	
25.05.06	212	7,905	not reliable	49,000	1	2	980	8,000	660	
07.06.06		5,430	13,800,000	88,000	150	300	2,200		1,200	
16.06.06	310	5,784	12,000,000	110,000	480	320,000	130,000		6,000	12,000
22.06.06		5,270	7,000,000	77,000	31	600	3,000		10	
30.06.06		5,693	9,300,000	41,000	16	100	5,000		2,000	10,000
04.07.06	266	4,612	11,000,000	1	550		1		21,000	29,000
14.07.06		5,189	55,000,000	96,000	160		960,000		100	
17.07.06	324	4,457	14,000,000	46,000	42		220,000		100	100
26.07.06	252	4,632	330,000	360,000	1	100	1,000		10	
03.08.06		4,405	60,000,000	300,000	76	2,200	4,800		2,500	
11.08.06	122	4,631	27,000,000	240,000	1	1,000	6,600		56,000	
16.08.06	772	3,651	40,000,000	180,000	48	240	4,500	2,400,000	3,400	61,000
23.08.06	812	3,609	6,200,000	520,000	2,400	100	1,000	1,200,000	15,000	
31.08.06	90	5,679	25,000,000	310,000	10	520	26,000	1,400,000	1,000	480
08.09.06	144	4,592	32,000,000	170,000	100	100	3,400		1,300	
11.09.06	1,983	4,854	6,000,000	2,600,000	560	84,000	180,000		70,000	2,800
19.09.06	598	4,185	2,900,000	22,000	1	100	1,000		10	
27.09.06	216	5,621	33,000,000	150,000	37	110,000	100		15,000	1,400
04.10.06	3,004	3,727	30,000,000	73,000	620	100	12,000		100	
10.10.06	2,905	5,761	13,000,000	72,000	170	21,000	4,000		750	2,200
20.10.06	747	6,905	4,000,000	32,000	40	18,000	10,000		1,000	
26.10.06	13,155	8,211	4,600,000	2,200	36	1,800	27,000	400,000	3,400	6,600
31.10.06	391	7,843	7,700,000	50,000	17	100	3,000	2,000,000	720	130
09.11.06	533	6,787	4,400,000	34,000	4	760	4,500	1,600,000	350	
16.11.06	4,250	6,963	3,300,000	1,000	21	3,700	4,200	880,000	960	890
23.11.06	3,854	6,638	640,000	1,000	1	1,600	2,600	2,120,000	740	
01.12.06	7,821	8,171	210,000	13,800	1	3,500	28,000	46,000	620	290
08.12.06	4,484	9,094	530,000	2,000	1	1,800	1,600	1,600,000	130	
11.12.06	2,887	8,606	792,000	3,800	1	1,400	600	730,000	340	270
19.12.06	1,715	8,548	440,000	26,000	1	3,500	2,400	2,000,000	57	
05.01.07	2,754	8,255	4,600,000	96,000	4	2,800	3,000	2,000,000	1,200	
10.01.07	1,769	8,003	2,300,000	29,000	1	440	740	1,100,000	1,300	230
15.01.07	1,962	8,409	3,200,000	21,000	1	100	950	200,000	160	
25.01.07	277	8,049	2,600,000	42,000	16	840	21,000	1,400,000	490	100
30.01.07	295	7,614	6,600,000	10,000	26	1,500	100	1,600,000	240	
09.02.07	1,609	8,192	4,700,000	1,000	41	10,000	2,300	3,120,000	960	640
12.02.07	576	7,344	2,400,000	15,800	800	10,000	17,000	4,800,000	10	350
22.02.07	5,184	7,352	340,000	35,000	2	2,200	3,300	390,000	54,000	680
28.02.07	2,041	7,608	2,800,000	10,000	3	1,000	1,700	1,000,000	670	

Date	B1 + B2 Overflow	Influent	Secondary Treatment Plant			Industrial sewer		Storm Tank	Industrial + Treated Domestic	
			Influent	Pre UV	Post UV	Baby's Walk	Bailick 1 Ind. Tank	at Bailick 1	Ballinacurra Sump	Rathcoursey Tank
	manual logs	cu.m./day	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml	f.c./100ml
05.03.07	10,876	7,865	19,000,000	1,000	1	330	3,100	12,000,000	380	
15.03.07	482	8,117	4,200,000	23,000	1	100	580	8,800,000	110	
20.03.07	619	7,743	2,800,000	22,000	29	280	2,000	10,000	720	
30.03.07	40	7,685	3,800,000	96,000	22	100	1,400	10,000	740	
02.04.07	562	6,624	29,000,000	25,000	5	3,200	1,800	100	90	
13.04.07	356	6,295	10,000	11,000	560	1,000	400	5,600,000	160	
19.04.07	785	6,589	8,200,000	10,000	10	100,000	100,000		10,000	
01.05.07	166	6,062	7,600,000	290,000	4	320	1,000		1,000	
09.05.07	58	5,254	3,900,000	76,000	12	100	22,000		3,500	10
14.05.07	0	5,997	10,000	110,000	14	100	1,900		200,000	
24.05.07	0	4,842	19,000,000	1,000	13	360	840			13,000
05.06.07	0	5,475	47,000,000	1,000	1	100	2,000		2,600	10
15.06.07	1,008	6,075	6,400,000	44,000	32	12,000	32,000	11,000,000	6,800	
21.06.07	1,906	5,535	10,000,000	1,000	10	100	4,800	1,000,000	1,100	2,600
27.06.07	374	4,982	10,000	1,000	100	100	900		1,600	
13.07.07			3,300,000	54,000	180	35,000	24,000	1,000,000	4,200	
19.07.07			16,000,000	1,000	3	730	5,200	2,400,000	340	3
25.07.07			10,000	1,000	830	100	2,800		100	1,000
31.07.07			14,000,000	74,000	1,200		13,000		2,600	
10.08.07			3,400,000	30,000	10	40,000	1,000	1,400,000	410	
13.08.07			100,000	7,000	10	100	3,200	2,900,000	320	
24.08.07			6,000,000	150,000	38	900	4,200		730	
30.08.07			26,000,000	450,000	54	440,000	230,000		46,000	70,000
05.09.07			2,800,000	44,000	14,000	13,000	1,000		380	1,000
10.09.07			10,000	1,000	1	100	17,000		25,000	
18.09.07			16,000,000	10,000	10	1,000	4,500		100	1,000
27.09.07			400,000	10,000	56	100	1,600		100	
05.10.07			21,000,000	186,000	5,400	6,000	2,000		1,700	
12.10.07			12,000,000	28,000	1,100	100	100		10	
19.10.07			9,200,000	120,000	62	1,000	1,000		740	100
26.10.07			10,000	260,000	720	18,000	43,000		3,100	

24" TIDEFLEX TF-2, 35, TF-1, 35-1

HEAD IN PIPE vs. Flow (Free Discharge)



Pipe flowing full is 200 Ag/m
94 ℓ/s

② 1/2 full is 200 Ag/m
= 12.5 ℓ/s

7560
126 ℓ/s
252 ℓ/s

Bailick 1

		INDUSTRIAL PUMPS HOURS RUN				DOMESTIC PUMPS HOURS RUN								STORM PUMPS HOURS RUN						DRAIN PUMPS HOURS RUN				WEIR SECTION		STORM TANK LEVELS		
Date	Time	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day	Cell 1	Cell 2	Cell 3
01/10/06	9.00	2723.70	2.02	3480.83	1.94	28462.06	26.37	19973.81	0.80	85.89	0.00	4554519	5144.00	203.76	0.60	134.05	0.57	130.79	0.60	361.33	0.00	373.60	0.00	13874.83	26.44	4.13	3.95	3.98
02/10/06	9.00	2726.03	2.33	3482.10	1.27	28483.82	21.76	19973.81	0.00	85.89	0.00	4558814	4295.00	203.82	0.06	134.13	0.08	130.84	0.05	361.33	0.00	373.60	0.00	13896.59	21.76	3.95	3.82	3.86
03/10/06	9.00	2726.70	0.67	3483.66	1.56	28505.86	22.04	19973.81	0.00	85.89	0.00	4563191	4377.00	203.87	0.05	134.19	0.06	130.92	0.08	361.33	0.00	373.60	0.00	13918.66	22.07	3.8	3.8	3.84
04/10/06	9.00	2728.47	1.77	3485.38	1.72	28505.86	0.00	19997.25	23.44	85.89	0.00	4567995	4804.00	203.91	0.04	134.22	0.03	130.94	0.02	361.33	0.00	373.60	0.00	13942.87	24.21	3.8	3.8	3.84
05/10/06	9.00	2730.68	2.21	3487.45	2.07	28505.89	0.03	20011.29	14.04	85.89	0.00	4571261	3266.00	204.31	0.40	134.63	0.41	131.36	0.42	361.33	0.00	373.60	0.00	13966.81	23.94	4.24	4.24	4.28
06/10/06	9.00	2733.34	2.66	3489.94	2.49	28522.63	16.74	20018.58	7.29	85.89	0.00	4576268	5007.00	204.39	0.08	134.71	0.08	131.43	0.07	361.33	0.00	373.60	0.00	13990.85	24.04	4.13	3.96	4
07/10/06	9.00	2735.86	2.52	3492.39	2.45	28522.63	0.00	20042.82	24.24	85.89	0.00	4581305	5037.00	204.46	0.07	134.77	0.06	131.49	0.06	361.33	0.00	373.60	0.00	14015.09	24.24	4.01	3.88	3.91
08/10/06	9.00	2738.52	2.66	3494.84	2.45	28522.63	0.00	20067.91	25.09	85.89	0.00	4586285	4980.00	204.56	0.10	134.88	0.11	131.61	0.12	361.33	0.00	373.60	0.00	14040.18	25.09	4.12	3.91	3.94
09/10/06	9.00	2741.46	2.94	3497.66	2.82	28522.63	0.00	20090.61	22.70	85.89	0.00	4590808	4523.00	205.21	0.65	135.52	0.64	132.25	0.64	361.33	0.00	373.60	0.00	14062.88	22.70	4.13	3.99	4.03
10/10/06	9.00	2744.35	2.89	3500.28	2.62	28522.63	0.00	20114.61	24.00	85.89	0.00	4595861	5053.00	205.42	0.21	135.74	0.22	132.44	0.19	361.33	0.00	373.60	0.00	14086.88	24.00	4.13	3.97	4.01
11/10/06	9.00	2747.13	2.78	3502.97	2.69	28522.63	0.00	20138.37	23.76	85.89	0.00	4600763	4902.00	205.78	0.36	136.1	0.36	132.82	0.38	361.33	0.00	373.60	0.00	14110.63	23.75	4.13	3.98	4.02
12/10/06	9.00	2749.64	2.51	3505.34	2.37	28539.41	16.78	20150.7	12.33	85.89	0.00	4603970	3207.00	206.28	0.50	136.6	0.50	133.29	0.47	361.33	0.00	373.60	0.00	14134.57	23.94	4.26	4.26	4.3
13/10/06	9.00	2751.83	2.19	3507.38	2.04	28546.72	7.31	20174.85	24.15	85.89	0.00	4610237	6267.00	206.37	0.09	136.7	0.10	133.39	0.10	361.33	0.00	373.60	0.00	14158.73	24.16	3.4	3.4	3.44
14/10/06	9.00	2753.52	1.69	3508.99	1.61	28546.89	0.17	20198.29	23.44	85.89	0.00	4616571	6334.00	206.37	0.00	136.7	0.00	133.39	0.00	361.33	0.00	373.60	0.00	14171.97	13.24	2.55	2.61	2.68
15/10/06	9.00	2755.83	2.31	3511.22	2.23	28546.89	0.00	20226.38	28.09	85.89	0.00	4622245	5674.00	206.37	0.00	136.7	0.00	133.39	0.00	361.33	0.00	373.60	0.00	14190.33	18.36	4.13	3.54	3.58
16/10/06	9.00	2757.29	1.46	3512.60	1.38	28546.89	0.00	20246.68	20.30	85.89	0.00	4626272	4027.00	206.45	0.08	136.76	0.06	133.45	0.06	361.33	0.00	373.60	0.00	14226.23	15.60	3.12	2.87	2.91
17/10/06	9.00	2758.97	1.68	3514.16	1.56	28546.89	0.00	20270.83	24.15	85.89	0.00	4632488	6216.00	206.51	0.06	136.82	0.06	133.51	0.06	361.33	0.00	373.60	0.00	14250.05	23.82	4.13	3.97	4
18/10/06	9.00	2761.13	2.16	3516.26	2.10	28546.89	0.00	20294.84	23.81	85.89	0.00	4637816	5328.00	206.8	0.29	137.13	0.31	133.79	0.28	361.33	0.00	373.60	0.00	14268.83	18.78	3.9	3.65	3.69
19/10/06	9.00	2763.52	2.39	3518.48	2.22	28564.89	18.00	20318.86	24.22	85.89	0.00	4644325	6509.00	206.86	0.06	137.17	0.04	133.85	0.06	361.33	0.00	373.60	0.00	14289.51	20.68	4.05	3.87	3.91
20/10/06	9.00	2766.74	3.22	3521.59	3.11	28564.89	0.00	20342.59	23.73	85.89	0.00	4650206	5881.00	206.9	0.04	137.23	0.06	133.91	0.06	361.33	0.00	373.6	0.00	14314.71	25.20	4.03	3.88	3.91
21/10/06	9.00	2769.72	2.98	3524.37	2.78	28572.93	8.04	20351.65	9.06	85.89	0.00	4656262	6056.00	206.95	0.05	137.27	0.04	133.95	0.04	361.33	0.00	373.6	0.00	14340.43	25.72	4.14	4.09	4.13
22/10/06	9.00	2772.13	2.41	3526.65	2.28	28588.65	15.72	20351.65	0.00	85.89	0.00	4661743	5481.00	207.39	0.44	137.71	0.44	134.39	0.44	361.33	0.00	373.6	0.00	14361.54	21.11	4.14	4.05	4.09
23/10/06	9.00	2774.53	2.40	3528.88	2.23	28609.76	21.11	20351.65	0.00	85.89	0.00	4668000	4257.00	207.67	0.28	138.01	0.30	134.66	0.27	361.33	0.00	373.6	0.00	14384	22.46	4.12	4.03	4.07
24/10/06	9.00	2777.59	3.06	3531.56	2.68	28629.66	19.90	20352.61	0.96	85.89	0.00	flow broke p.	#VALUE!	208.12	0.45	138.46	0.45	135.08	0.42	361.33	0.00	373.6	0.00	14408.02	24.02	4.28	4.28	4.32
25/10/06	9.00	2780.35	2.76	3534.10	2.54	28645.43	15.77	20359.22	6.61	85.89	0.00	flow broke p.	#VALUE!	208.69	0.57	139.04	0.58	135.67	0.59	361.33	0.00	373.6	0.00	14432.22	24.20	4.13	4.05	4.09
26/10/06	9.00	2785.12	4.77	3538.60	4.50	28647.13	1.70	20380.62	21.40	85.89	0.00	flow broke p.	#VALUE!	210.4	1.71	140.84	1.80	137.32	1.65	361.33	0.00	373.6	0.00	14456.03	23.81	4.13	3.94	3.98
27/10/06	9.00	2787.81	2.69	3541.15	2.55	28648.33	1.20	20402.14	21.52	85.89	0.00	flow broke p.	#VALUE!	210.65	0.25	141.12	0.28	137.57	0.25	361.33	0.00	373.6	0.00	14481.18	25.15	4.12	3.9	3.93
28/10/06	9.00	2790.13	2.32	3543.33	2.18	28651.36	3.03	20423.09	20.95	85.89	0.00	flow broke p.	#VALUE!	210.93	0.28	141.37	0.25	137.85	0.28	361.33	0.00	373.6	0.00	14505.51	24.33	4.13	3.95	3.99
29/10/06	9.00	2792.05	1.92	3545.17	1.84	28652.66	1.30	20445.01	21.92	85.89	0.00	flow broke p.	#VALUE!	211.04	0.11	141.51	0.14	137.96	0.11	361.33	0.00	373.6	0.00	14530.49	24.98	3.97	3.88	3.91
30/10/06	9.00	2793.81	1.76	3546.87	1.70	28653.79	1.13	20467.77	22.76	85.89	0.00	flow broke p.	#VALUE!	211.2	0.16	141.65	0.14	138.12	0.16	361.33	0.00	373.6	0.00	14552.98	22.49	3.92	3.87	3.91
31/10/06	9.00	2795.71	1.90	3548.62	1.75	28655.01	1.22	20488.04	20.27	85.89	0.00	flow broke p.	#VALUE!	211.25	0.05	141.73	0.08	138.18	0.06	361.33	0.00	373.6	0.00					
Totals			74.03		69.73		219.32		515.03		0.00		#VALUE!		8.09		8.25		7.99		0.00		0.00		704.59			
31/10/06 Forward		2795.71		3548.62		28655.01		20488.04		85.89		flow broke p.s		211.25		141.73		138.18		361.33		373.60		14552.98				

Bailick 2

		FOUL PUMPS HOURS RUN						STORM PUMPS HOURS RUN				WEIR SECTION	
Date	Time	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day
01/10/06	9.15	17860.41	26.48	19123.00	0.01	3674674	952.00	160.09	1.15	92.01	0.00	6857.05	26.68
02/10/06	9.15	17882.13	21.72	19123.00	0.00	3675695	1021.00	160.10	0.01	92.01	0.00	6870.09	13.04
03/10/06	9.15	17904.18	22.05	19123	0.00	3676106	411.00	160.10	0.00	92.01	0.00	6881.49	11.40
04/10/06	9.15	17928.41	24.23	19123	0.00	3676547	441.00	160.41	0.31	92.01	0.00	6905.70	24.21
05/10/06	9.15	17934.67	6.26	19140.69	17.69	3677008	461.00	161.20	0.79	92.01	0.00	6927.18	21.48
06/10/06	9.15	17934.67	0.00	19164.72	24.03	3677921	913.00	161.59	0.39	92.01	0.00	6951.22	24.04
07/10/06	9.15	17934.67	0.00	19188.94	24.22	3678756	835.00	162.05	0.46	92.01	0.00	6975.43	24.21
08/10/06	9.15	17934.67	0.00	19214.03	25.09	3679381	625.00	162.93	0.88	92.01	0.00	7000.53	25.10
09/10/06	9.15	17957.38	22.71	19214.03	0.00	3680202	821.00	164.93	2.00	92.01	0.00	7023.24	22.71
10/10/06	9.15	17981.41	24.03	19214.03	0.00	3681071	869.00	165.64	0.71	92.01	0.00	7047.25	24.01
11/10/06	9.15	18005.15	23.74	19214.03	0.00	3681930	859.00	166.65	1.01	92.01	0.00	7071.00	23.75
12/10/06	9.15	18029.08	23.93	19214.03	0.00	3682796	866.00	167.22	0.57	92.01	0.00	7094.92	23.92
13/10/06	9.15	18053.37	24.29	19214.03	0.00	3683675	879.00	167.38	0.16	92.01	0.00	7119.22	24.30
14/10/06	9.15	18076.91	23.54	19214.03	0.00	3684526	851.00	167.38	0.00	92.01	0.00	7141.82	22.60
15/10/06	9.15	18104.86	27.95	19214.03	0.00	3685501	975.00	167.38	0.00	92.01	0.00	7141.89	0.07
16/10/06	9.15	18125.31	20.45	19214.03	0.00	3686133	632.00	167.38	0.00	92.01	0.00	7141.89	0.00
17/10/06	9.15	18149.46	24.15	19214.03	0.00	3686834	701.00	167.38	0.00	92.01	0.00	7141.91	0.02
18/10/06	9.15	18173.29	23.83	19214.03	0.00	3687694	860.00	168.04	0.66	92.01	0.00	7165.75	23.84
19/10/06	9.15	18197.47	24.18	19214.03	0.00	3688476	782.00	168.65	0.61	92.01	0.00	7189.92	24.17
20/10/06	9.15	18221.2	23.73	19214.03	0.00	3689071	595.00	169.46	0.81	92.01	0.00	7213.65	23.73
21/10/06	9.15	18246.41	25.21	19214.03	0.00	3689920	849.00	170.14	0.68	92.01	0.00	7238.86	25.21
22/10/06	9.15	18272.11	25.70	19214.03	0.00	3690778	858.00	171.55	1.41	92.01	0.00	7264.57	25.71
23/10/06	9.15	18293.22	21.11	19214.03	0.00	3691468	690.00	172.29	0.74	92.01	0.00	7285.67	21.10
24/10/06	9.15	18317.26	24.04	19214.03	0.00	3692337	869.00	173.07	0.78	92.01	0.00	7309.71	24.04
25/10/06	9.15	18341.33	24.07	19214.03	0.00	3693208	871.00	173.71	0.64	92.01	0.00	7333.79	24.08
26/10/06	9.15	18365.49	24.16	19214.03	0.00	3693523	315.00	177.79	4.08	92.01	0.00	7357.95	24.16
27/10/06	9.15	18389.35	23.86	19214.03	0.00	3694028	505.00	178.72	0.93	92.01	0.00	7381.81	23.86
28/10/06	9.15	18389.35	0.00	19239.13	25.10	3694180	152.00	179.88	1.16	92.01	0.00	7406.91	25.10
29/10/06	9.15	18413.65	24.30	19239.15	0.02	3695060	880.00	180.18	0.30	92.01	0.00	7431.23	24.32
30/10/06	9.15	18438.75	25.10	19239.15	0.00	3695596	536.00	180.64	0.46	92.01	0.00	7456.33	25.10
31/10/06	9.15	18438.78	0.03	19261.5	22.35	3695839	243.00	181.3	0.66	92.01	0.00	7478.7	22.37
Totals			604.85		138.51		22117.00		22.36		0.00		648.33
Forward		18438.78		19261.50		3695839.00		181.30		92.01		7478.70	

Midleton WWTP

Bailick 1

		INDUSTRIAL PUMPS HOURS RUN				DOMESTIC PUMPS HOURS RUN								STORM PUMPS HOURS RUN						DRAIN PUMPS HOURS RUN				WEIR SECTION		STORM TANK LEVELS		
Date	Time	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day	Cell 1	Cell 2	Cell 3
01/11/06	9.00	2797.83	2.12	3550.66	2.04	28656.20	1.19	20509.82	21.78	85.89	0.00	flow broke	#VALUE!	211.31	0.06	141.77	0.04	138.23	0.05	361.33	0.00	373.60	0.00	14577.01	24.03	4.12	3.94	3.98
02/11/06	9.00	2799.75	1.92	3552.47	1.81	28657.39	1.19	20531.65	21.83	85.89	0.00	flow broke	#VALUE!	211.37	0.06	141.84	0.07	138.29	0.06	361.33	0.00	373.60	0.00	14601.11	24.10	3.76	3.77	3.81
03/11/06	9.00	2802.01	2.26	3554.61	2.14	28680.18	22.79	20534.63	2.98	85.89	0.00	6062	#VALUE!	211.43	0.06	141.88	0.04	138.35	0.06	361.33	0.00	373.60	0.00	14626.92	25.81	4.12	3.95	3.99
04/11/06	9.00	2804.05	2.04	3556.55	1.94	28702.24	22.06	20534.63	0.00	85.89	0.00	11892	5830.00	211.52	0.09	142	0.12	138.46	0.11	361.33	0.00	373.60	0.00	14649.05	22.13	4.05	3.97	3.91
05/11/06	9.00	2806.24	2.19	3558.62	2.07	28728.44	26.20	20534.63	0.00	85.89	0.00	18887	6995.00	211.82	0.30	142.17	0.17	138.56	0.10	361.33	0.00	373.60	0.00	14675.27	26.22	4.03	3.87	3.91
06/11/06	9.00	2808.44	2.20	3560.70	2.08	28751.97	23.53	20534.63	0.00	85.89	0.00	25199	6312.00	211.82	0.00	142.18	0.01	138.62	0.06	361.33	0.00	373.60	0.00	14698.79	23.52	4.13	3.95	3.99
07/11/06	9.00	2810.78	2.34	3562.98	2.28	28774.16	22.19	20534.63	0.00	85.89	0.00	31152	5953.00	211.82	0.00	142.29	0.11	138.75	0.13	361.33	0.00	373.60	0.00	14720.97	22.18	4.08	3.87	3.91
08/11/06	9.00	2813.39	2.61	3565.40	2.42	28798.37	24.21	20534.63	0.00	85.89	0.00	37646	6494.00	211.91	0.09	142.37	0.08	138.83	0.08	361.33	0.00	373.60	0.00	14745.18	24.21	4.04	3.87	3.91
09/11/06	9.00	2815.65	2.26	3567.55	2.15	28822.27	23.90	20534.63	0.00	85.89	0.00	44080	6434.00	211.97	0.06	142.43	0.06	138.89	0.06	361.33	0.00	373.60	0.00	14769.07	23.89	3.83	3.77	3.81
10/11/06	9.00	2817.69	2.04	3569.52	1.97	28846.31	24.04	20534.63	0.00	85.89	0.00	50564	6484.00	211.97	0.00	142.43	0.00	138.89	0.00	361.33	0.00	373.60	0.00	14793.12	24.05	3.74	3.71	3.75
11/11/06	9.00	2819.68	1.99	3571.37	1.85	28870.9	24.59	20536.22	1.59	85.89	0.00	57165	6601.00	212.07	0.10	142.55	0.12	139.01	0.12	361.33	0.00	373.60	0.00	14819.3	26.18	4.06	3.88	3.91
12/11/06	9.00	2821.14	1.46	3572.76	1.39	28894.95	24.05	20536.29	0.07	85.89	0.00	63133	5968.00	212.14	0.07	142.61	0.06	139.06	0.05	361.33	0.00	373.60	0.00	14843.42	24.12	3.92	3.79	3.83
13/11/06	9.00	2822.35	1.21	3573.92	1.16	28894.95	0.00	20558	21.71	85.89	0.00	68996	5863.00	212.14	0.00	142.61	0.00	139.06	0.00	361.33	0.00	373.60	0.00	14860.39	16.97	3.35	3.36	3.4
14/11/06	9.00	2824.08	1.73	3575.59	1.67	28894.95	0.00	20581.99	23.99	85.89	0.00	75478	6482.00	212.14	0.00	142.61	0.00	139.06	0.00	361.33	0.00	373.60	0.00	14860.39	0.00	2.93	2.95	2.99
15/11/06	9.00	2825.93	1.85	3577.36	1.77	28895.1	0.15	20606.02	24.03	85.89	0.00	81785	6307.00	212.21	0.07	142.69	0.08	139.13	0.07	361.33	0.00	373.60	0.00	14867.18	6.79	4.31	4.31	4.35
16/11/06	9.00	2830.96	5.03	3581.83	4.47	28918.96	23.86	20608.02	0.00	85.89	0.00	87531	5746.00	214.22	2.01	144.78	2.09	141.09	1.96	361.33	0.00	373.60	0.00	14890.94	23.76	4.15	4.15	4.19
17/11/06	9.00	2834.00	3.04	3584.73	2.90	28942.87	23.91	20608.03	0.01	85.89	0.00	93303	5772.00	214.87	0.65	145.44	0.66	141.73	0.64	361.33	0.00	373.60	0.00	14914.9	23.96	4.13	4.11	4.15
18/11/06	9.00	2837.09	3.09	3587.65	2.92	28942.87	0.00	20632.6	26.57	85.89	0.00	100474	7171.00	215.18	0.31	145.75	0.31	142.04	0.31	361.33	0.00	373.60	0.00	14941.47	26.57	4.14	4.02	4.06
19/11/06	9.00	2839.30	2.21	3589.75	2.10	28942.87	0.00	20655.85	23.25	85.89	0.00	106753	6279.00	215.41	0.23	145.99	0.24	142.29	0.25	361.33	0.00	373.60	0.00	14964.71	23.24	4.14	4.01	4.05
20/11/06	9.00	2842.04	2.74	3592.34	2.59	28942.87	0.00	20678.01	22.16	85.89	0.00	112741	5988.00	216.01	0.60	146.59	0.60	142.87	0.58	361.33	0.00	373.6	0.00	14986.88	22.17	4.13	4.01	4.05
21/11/06	9.00	2844.70	2.66	3594.86	2.52	28942.87	0.00	20702.81	24.80	85.89	0.00	119301	6560.00	216.38	0.37	146.97	0.38	143.25	0.38	361.33	0.00	373.6	0.00	15011.16	24.28	4.14	4.08	4.11
22/11/06	9.00	2847.24	2.54	3597.26	2.40	28942.87	0.00	20725	22.19	85.89	0.00	125704	6403.00	216.69	0.31	147.29	0.32	143.56	0.31	361.33	0.00	373.6	0.00	15034.87	23.71	4.13	4.02	4.06
23/11/06	9.00	2850.35	3.11	3600.23	2.97	28942.87	0.00	20750.38	25.38	85.89	0.00	132370	6666.00	217.31	0.62	147.91	0.62	144.13	0.57	361.33	0.00	373.6	0.00	15059.55	24.68	4.14	4.13	4.17
24/11/06	9.00	2853.43	3.08	3603.18	2.95	28942.87	0.00	20774.48	24.10	85.89	0.00	138806	6436.00	217.75	0.44	148.36	0.45	144.59	0.46	361.33	0.00	373.6	0.00	15083.36	23.81	4.25	4.26	4.3
25/11/06	9.00	2857.20	3.77	3606.71	3.53	28942.87	0.00	20801.72	27.24	85.89	0.00	146160	7354.00	218.7	0.95	149.68	1.32	145.49	0.90	361.33	0.00	373.6	0.00	15110.6	27.24	4.15	4.15	4.19
26/11/06	9.00	2859.58	2.38	3608.93	2.22	28942.87	0.00	20823.96	22.24	85.89	0.00	152167	6007.00	219.08	0.38	149.68	0.00	145.88	0.39	361.33	0.00	373.6	0.00	15132.84	22.24	4.13	3.99	4.03
27/11/06	9.00	2861.99	2.41	3611.19	2.26	28942.87	0.00	20846.81	22.85	85.89	0.00	158340	6173.00	219.66	0.58	150.26	0.58	146.45	0.57	361.33	0.00	373.6	0.00	15155.69	22.85	4.18	4.18	4.22
28/11/06	9.00	2864.53	2.54	3613.64	2.45	28942.87	0.00	20869.97	23.16	85.89	0.00	164588	6248.00	220.17	0.51	150.79	0.53	146.95	0.50	361.33	0.00	373.6	0.00	15178.84	23.15	4.13	3.97	4.01
29/11/06	9.00	2868.90	2.37	3615.85	2.21	28942.87	0.00	20893.83	23.86	85.89	0.00	171012	6424.00	220.58	0.41	151.2	0.41	147.36	0.41	361.33	0.00	373.6	0.00	15202.7	23.86	4.21	4.21	4.25
30/11/06	9.00	2869.28	2.38	3618.14	2.29	28942.87	0.00	20917.92	24.09	85.89	0.00	177514	6502.00	220.92	0.34	151.55	0.35	147.71	0.35	361.33	0.00	373.6	0.00	15226.79	24.09	4.13	3.94	3.98
Totals			73.57		69.52		287.86		429.88		0.00		#VALUE!		9.67		9.82		9.53		0.00		0.00		673.81			
30/11/06 Forward		2869.28		3618.14		28942.87		20917.92		85.89		177514.00		220.92		151.55		147.71		361.33		373.60		15226.79				

Bailick 2

		FOUL PUMPS HOURS RUN						STORM PUMPS HOURS RUN				WEIR SECTION	
Date	Time	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day
01/11/06	9.15	18438.78	0.00	19285.53	24.03	3696710	871.00	181.43	0.13	92.01	0.00	7502.73	24.03
02/11/06	9.15	18438.78	0.00	19309.63	24.10	3697583	873.00	181.53	0.10	92.01	0.00	7526.84	24.11
03/11/06	9.15	18438.78	0.00	19335.53	25.90	3698520	937.00	181.84	0.31	92.01	0.00	7552.73	25.89
04/11/06	9.15	18438.78	0.00	19357.58	22.05	3698992	472.00	182.53	0.69	92.01	0.00	7574.78	22.05
05/11/06	9.15	18464.98	26.20	19357.6	0.02	3699375	383.00	183.61	1.08	92.01	0.00	7601.01	26.23
06/11/06	9.15	18488.46	23.48	19357.64	0.04	3700369	994.00	184.23	0.62	92.01	0.00	7624.54	23.53
07/11/06	9.15	18510.62	22.16	19357.64	0.00	3701459	1090.00	184.74	0.51	92.01	0.00	7646.68	22.14
08/11/06	9.15	18535.28	24.66	19357.64	0.00	3702598	1139.00	185.24	0.50	92.01	0.00	7671.36	24.68
09/11/06	9.15	18535.37	0.09	19362.27	4.63	3702703	105.00	186.31	1.07	92.01	0.00	7694.80	23.44
10/11/06	9.15	18559.46	24.09	19362.28	0.01	3703006	303.00	187.05	0.74	92.01	0.00	7718.88	24.08
11/11/06	9.15	18560.17	0.71	19387.28	25.00	3703772	766.00	187.6	0.55	92.01	0.00	7745.08	26.20
12/11/06	9.15	18560.17	0.00	19411.36	24.08	3704065	293.00	188.13	0.53	92.01	0.00	7769.15	24.07
13/11/06	9.15	18560.17	0.00	19433.09	21.73	3704262	197.00	188.66	0.53	92.01	0.00	7790.81	21.66
14/11/06	9.15	18560.17	0.00	19456.51	23.42	3705027	765.00	188.88	0.22	92.01	0.00	7808.07	17.26
15/11/06	9.15	18560.17	0.00	19456.63	0.12	3705031	4.00	190.44	1.56	92.01	0.00	7829.01	20.94
16/11/06	9.15	18560.17	0.00	19479.4	22.77	3705059	28.00	193.61	3.17	92.01	0.00	7851.83	22.82
17/11/06	9.15	18560.17	0.00	19502.94	23.54	3706250	1191.00	194.15	0.54	92.01	0.00	7875.01	23.18
18/11/06	9.15	18560.17	0.00	19524.03	21.09	3707016	766.00	194.63	0.48	92.01	0.00	7901.55	26.54
19/11/06	9.15	18560.17	0.00	19547.28	23.25	3707855	839.00	194.91	0.28	92.01	0.00	7924.8	23.25
20/11/06	9.15	18560.17	0.00	19569.43	22.15	3708191	336.00	196.64	1.73	92.01	0.00	7946.95	22.15
21/11/06	9.15	18560.17	0.00	19593.78	24.33	3708568	377.00	197.66	1.02	92.01	0.00	7971.28	24.33
22/11/06	9.15	18560.17	0.00	19617.1	23.34	3709358	790.00	198.28	0.62	92.01	0.00	7994.95	23.67
23/11/06	9.15	18560.17	0.00	19641.89	24.79	3709905	547.00	199.91	1.63	92.01	0.00	8019.73	24.78
24/11/06	9.15	18560.17	0.00	19665.62	23.73	3710107	202.00	201.55	1.64	92.01	0.00	8043.47	23.74
25/11/06	9.15	18560.17	0.00	19692.5	26.88	3711486	1379.00	203.27	1.72	92.01	0.00	8070.69	27.22
26/11/06	9.15	18560.18	0.01	19714.74	22.24	3712692	1206.00	203.64	0.37	92.01	0.00	8092.93	22.24
27/11/06	9.15	18560.18	0.00	19737.59	22.85	3713930	1238.00	204.59	0.95	92.01	0.00	8115.73	22.80
28/11/06	9.15	18560.18	0.00	19760.72	23.13	3715064	1134.00	205.1	0.51	92.01	0.00	8138.91	23.18
29/11/06	9.15	18560.18	0.00	19784.6	23.88	3715765	701.00	206.09	0.99	92.01	0.00	8162.79	23.88
30/11/06	9.15	18581.23	21.05	19786.65	2.25	3717006	1241.00	206.48	0.39	92.01	0.00	8186.87	24.08
Totals			142.45		525.35		21167.00		25.18		0.00		708.17
Forward		18581.23		19786.65		3717006.00		206.48		92.01		8186.87	

Midleton WWTP

Bailick 1

Date	Time	INDUSTRIAL PUMPS HOURS RUN				DOMESTIC PUMPS HOURS RUN								STORM PUMPS HOURS RUN						DRAIN PUMPS HOURS RUN				WEIR SECTION		STORM TANK LEVELS		
		Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day	Cell 1	Cell 2	Cell 3
01/12/06	9.00	2874.80	5.52	3623.20	5.06	28958.56	15.69	20928.16	10.24	85.89	0.00	183586	6072.00	223.09	2.17	153.76	2.21	149.86	2.15	361.33	0.00	373.60	0.00	15250.78	23.99	4.27	4.27	4.31
02/12/06	9.00	2879.45	4.65	3627.63	4.43	28958.59	0.03	20952.61	24.45	85.89	0.00	190388	6802.00	224.30	1.21	154.99	1.23	151.05	1.19	361.33	0.00	373.60	0.00	15276.06	25.28	4.26	4.27	4.3
03/12/06	9.00	2884.87	5.42	3632.59	4.96	28958.59	0.00	20976.63	24.02	85.89	0.00	196780	6392.00	226.74	2.44	157.55	2.56	153.49	2.44	361.33	0.00	373.60	0.00	15300.08	24.02	4.29	4.29	433
04/12/06	9.00	2889.99	5.12	3637.23	4.64	28958.59	0.00	20999.49	22.86	85.89	0.00	202863	6083.00	228.4	1.66	159.29	1.74	155.12	1.63	361.33	0.00	373.60	0.00	15322.94	22.86	4.28	4.28	4.32
05/12/06	9.00	2894.50	4.51	3641.39	4.16	28958.59	0.00	21023.44	23.95	85.89	0.00	209266	6403.00	230.42	2.02	161.38	2.09	157.15	2.03	361.33	0.00	373.60	0.00	15346.89	23.95	4.29	4.29	4.33
06/12/06	9.00	2898.33	3.83	3644.97	3.58	28973.6	15.01	21047.21	23.77	85.92	0.03	216224	6958.00	231.74	1.32	162.73	1.35	158.49	1.34	361.33	0.00	373.60	0.00	15370.77	23.88	4.27	4.27	4.31
07/12/06	9.00	2901.84	3.51	3648.32	3.35	28997.89	24.29	21071.5	24.29	85.92	0.00	223661	7437.00	232.92	1.18	163.89	1.16	159.62	1.13	361.33	0.00	373.60	0.00	15395.06	24.29	4.27	4.27	4.31
08/12/06	9.00	2904.95	3.11	3651.21	2.89	29021.59	23.70	21095.21	23.71	85.92	0.00	231073	7412.00	233.71	0.79	164.67	0.78	160.4	0.78	361.33	0.00	373.60	0.00	15418.76	23.70	4.25	4.25	4.29
09/12/06	9.00	2907.72	2.77	3653.84	2.63	29046.9	25.31	21120.51	25.30	85.92	0.00	239273	8200.00	234.3	0.59	165.28	0.61	161.01	0.61	361.33	0.00	373.60	0.00	15444.06	25.30	4.14	4.05	4.09
10/12/06	9.00	2910.00	2.28	3656.00	2.16	29070.8	23.90	21144.42	23.91	85.92	0.00	247025	7752.00	234.75	0.45	165.74	0.46	161.44	0.43	361.33	0.00	373.60	0.00	15467.97	23.91	4.2	4.2	4.24
11/12/06	9.00	2912.08	2.08	3658.00	2.00	29093.8	23.00	21167.41	22.99	85.92	0.00	254475	7450.00	235.36	0.61	166.34	0.60	162.04	0.60	361.33	0.00	373.60	0.00	15490.96	22.99	4.18	4.18	4.22
12/12/06	9.00	2914.21	2.13	3660.03	2.03	29117.64	23.84	21191.25	23.84	85.92	0.00	262203	7728.00	235.76	0.40	166.74	0.40	162.44	0.40	361.33	0.00	373.60	0.00	15514.8	23.84	4.13	3.95	3.98
13/12/06	9.00	2916.47	2.26	3662.13	2.10	29141.79	24.15	21215.41	24.16	85.92	0.00	270034	7831.00	236.04	0.28	167.02	0.28	162.71	0.27	361.33	0.00	373.60	0.00	15538.96	24.16	4.13	3.94	3.97
14/12/06	9.00	2918.73	2.26	3664.27	2.14	29165.75	23.96	21239.37	23.96	85.92	0.00	277800	7766.00	236.33	0.29	167.34	0.32	163.01	0.30	361.33	0.00	373.60	0.00	15562.92	23.96	4.13	3.96	3.99
15/12/06	9.00	2921.18	2.45	3666.63	2.36	29189.73	23.98	21263.35	23.98	85.92	0.00	285573	7773.00	236.77	0.44	167.76	0.42	163.44	0.43	361.33	0.00	373.60	0.00	15586.9	23.98	4.26	4.27	4.3
16/12/06	9.00	2923.95	2.77	3669.24	2.61	29215.22	25.49	21288.84	25.49	85.92	0.00	293838	8265.00	237.48	0.71	168.5	0.74	164.15	0.71	361.33	0.00	373.60	0.00	15612.39	25.49	4.13	3.98	4.02
17/12/06	9.00	2925.89	1.94	3671.05	1.81	29239.32	24.10	21312.93	24.09	85.92	0.00	301648	7810.00	237.8	0.32	168.82	0.32	164.46	0.31	361.33	0.00	373.60	0.00	15636.48	24.09	4.12	3.93	3.98
18/12/06	9.00	2927.66	1.77	3672.76	1.71	29261.9	22.58	21317.51	4.58	85.93	0.01	307618	5970.00	238.28	0.48	169.31	0.49	164.94	0.48	361.33	0.00	373.60	0.00	15659.07	22.59	4.14	4.13	4.17
19/12/06	9.00	2929.77	2.11	3674.73	1.97	29285.51	23.61	21341.11	23.60	85.93	0.00	314611	6993.00	238.66	0.38	169.67	0.36	165.32	0.38	361.33	0.00	373.60	0.00	15682.95	23.88	4.12	3.94	3.98
20/12/06	9.00	2931.98	2.21	3676.85	2.12	29309.57	24.06	21365.18	24.07	85.93	0.00	321850	7239.00	238.94	0.28	169.95	0.28	165.59	0.27	361.33	0.00	373.6	0.00	15706.74	23.79	4.12	3.93	3.97
21/12/06	9.00	2934.28	2.30	3679.01	2.16	29333.64	24.07	21389.24	24.06	85.93	0.00	329168	7318.00	239.17	0.23	170.21	0.26	165.83	0.24	361.33	0.00	373.6	0.00	15730.8	24.06	4.12	3.92	3.96
22/12/06	9.00	2936.50	2.22	3681.15	2.14	29357.82	24.18	21413.43	24.19	85.93	0.00	336631	7463.00	239.35	0.18	170.38	0.17	166	0.17	361.33	0.00	373.6	0.00	15754.99	24.19	4.12	3.92	3.96
23/12/06	9.00	2937.94	1.44	3682.50	1.35	29381.82	24.00	21434.43	21.00	85.93	0.00	344038	7407.00	239.5	0.15	170.54	0.16	166.18	0.18	361.33	0.00	373.6	0.00	15778.99	24.00	4.13	3.93	3.96
24/12/06	9.00	2939.27	1.33	3683.73	1.23	29406.02	24.21	21461.64	27.21	85.93	0.00	351532	7494.00	239.68	0.18	170.72	0.18	166.35	0.17	361.33	0.00	373.6	0.00	15803.2	24.21	4.13	3.95	3.99
25/12/06	9.00	2940.59	1.32	3685.01	1.28	29431.55	25.52	21487.16	25.52	85.93	0.00	359334	7802.00	239.89	0.21	170.93	0.21	166.55	0.20	361.33	0.00	373.6	0.00	15828.72	25.52	4.13	4.01	4.05
26/12/06	9.00	2941.77	1.18	3686.13	1.12	29455.16	23.61	21510.77	23.61	85.93	0.00	366610	7276.00	239.97	0.08	171.01	0.08	166.64	0.09	361.33	0.00	373.6	0.00	15852.33	23.61	4.12	3.92	3.96
27/12/06	9.00	2943.16	1.39	3687.42	1.29	29478.21	23.05	21533.82	23.05	85.93	0.00	373755	7145.00	240.57	0.60	171.6	0.59	167.22	0.58	361.33	0.00	373.6	0.00	15875.38	23.05	4.24	4.25	4.29
28/12/06	9.00	2944.81	1.65	3688.99	1.57	29502.05	23.84	21557.66	23.84	85.93	0.00	381319	7564.00	240.87	0.30	171.9	0.30	167.51	0.29	361.33	0.00	373.6	0.00	15899.22	23.84	4.11	3.9	3.94
29/12/06	9.00	2946.29	1.48	3690.39	1.40	29526.06	24.01	21581.67	24.01	85.93	0.00	388807	7488.00	241.32	0.45	172.38	0.48	167.98	0.47	361.33	0.00	373.6	0.00	15923.24	24.02	4.18	4.18	4.22
30/12/06	9.00	2948.89	2.60	3692.88	2.49	29551.23	25.17	21606.84	25.17	85.93	0.00	396667	8060.00	242.23	0.91	173.35	0.97	168.87	0.89	361.33	0.00	373.6	0.00	15948.4	25.16	4.13	4.06	4.1
31/12/06	9.00	2950.52	1.63	3694.40	1.52	29574.84	23.61	21630.45	23.61	85.93	0.00	404431.00	7564.00	242.58	0.35	173.71	0.36	169.24	0.37	361.33	0.00	373.6	0.00	15972.01	23.61	4.14	4.09	4.13
Totals			81.24		76.26		631.97		712.53		0.84		225917.00		21.66		22.16		21.53		0.00		0.00		745.22			
31/12/06 Forward		2950.52		3694.40		29574.84		21630.45		85.93		404431.00		242.58		173.71		169.24		361.33		373.60		15972.01				

Bailick 2

Date	Time	FOUL PUMPS HOURS RUN						STORM PUMPS HOURS RUN				WEIR SECTION	
		Pump 1	Hrs/Day	Pump 2	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day
01/12/06	9.15	18605.24	24.01	19786.85	0.00	67934	-3649072.00	209.03	2.55	92.01	0.00	8201.86	14.99
02/12/06	9.15	18630.50	25.26	19786.85	0.00	69303	1369.00	209.91	0.88	92.01	0.00	8236.14	34.28
03/12/06	9.15	18654.52	24.02	19786.85	0.00	70604	1301.00	212.74	2.83	92.01	0.00	8260.16	24.02
04/12/06	9.15	18677.38	22.86	19786.85	0.00	71844	1240.00	214.13	1.39	92.01	0.00	8283.02	22.86
05/12/06	9.15	18701.34	23.96	19786.85	0.00	73141	1297.00	216.85	2.72	92.01	0.00	8306.98	23.96
06/12/06	9.15	18725.76	24.42	19786.85	0.00	74465	1324.00	218.74	1.89	92.01	0.00	8331.40	24.42
07/12/06	9.15	18748.72	22.96	19786.85	0.00	75580	1115.00	220.74	2.00	92.01	0.00	8354.36	22.96
08/12/06	9.15	18773.04	24.32	19786.85	0.00	76461	881.00	222.53	1.79	92.01	0.00	8378.68	24.32
09/12/06	9.15	18797.75	24.71	19786.85	0.00	77355	894.00	223.78	1.25	92.01	0.00	8403.39	24.71
10/12/06	9.15	18821.6	23.85	19786.85	0.00	78219	864.00	224.78	1.00	92.01	0.00	8427.24	23.85
11/12/06	9.15	18844.62	23.02	19786.85	0.00	79051	832.00	226.01	1.23	92.01	0.00	8450.26	23.02
12/12/06	9.15	18868.89	24.27	19786.85	0.00	79929	878.00	226.72	0.71	92.01	0.00	8474.53	24.27
13/12/06	9.15	18892.59	23.70	19786.85	0.00	80787	858.00	227.28	0.56	92.01	0.00	8498.22	23.69
14/12/06	9.15	18916.53	23.94	19786.85	0.00	81653	866.00	227.94	0.66	92.01	0.00	8522.17	23.95
15/12/06	9.15	18940.57	24.04	19786.85	0.00	82523	870.00	228.98	1.04	92.01	0.00	8546.13	23.96
16/12/06	9.15	18966.01	25.44	19786.85	0.00	83444	921.00	229.92	0.94	92.01	0.00	8571.64	25.51
17/12/06	9.15	18990.09	24.08	19786.85	0.00	84316	872.00	230.37	0.45	92.01	0.00	8589.73	18.09
18/12/06	9.15	19012.71	22.62	19786.85	0.00	85150	834.00	231.06	0.69	92.01	0.00	8618.35	28.62
19/12/06	9.15	19036.26	23.57	19786.85	0.00	86427	1277.00	231.16	0.10	92.01	0.00	8641.91	23.56
20/12/06	9.15	19060.44	24.16	19786.85	0.00	87736	1309.00	231.26	0.10	92.01	0.00	8666.07	24.16
21/12/06	9.15	19084.42	23.98	19786.85	0.00	89036	1300.00	231.37	0.11	92.01	0.00	8690.06	23.99
22/12/06	9.15	19108.6	24.18	19786.85	0.00	90346	1310.00	231.51	0.14	92.01	0.00	8714.24	24.18
23/12/06	9.15	19132.67	24.07	19786.85	0.00	90977	631.00	232.16	0.65	92.01	0.00	8738.3	24.06
24/12/06	9.15	19132.67	0.00	19811.01	24.16	91216	239.00	233.14	0.98	92.01	0.00	8762.49	24.19
25/12/06	9.15	19132.67	0.00	19836.5	25.49	91722	506.00	234.01	0.87	92.01	0.00	8787.97	25.48
26/12/06	9.15	19132.7	0.03	19836.54	0.04	91722	0.00	235.06	1.05	92.01	0.00	8811.61	23.64
27/12/06	9.15	19132.76	0.06	19836.57	0.03	91722	0.00	237.23	2.17	92.01	0.00	8834.75	23.14
28/12/06	9.15	19133.14	0.38	19858.93	22.36	91912	190.00	238.24	1.01	92.01	0.00	8858.47	23.72
29/12/06	9.15	19133.14	0.00	19883.02	24.09	92649	737.00	239.31	1.07	92.01	0.00	8882.51	24.04
30/12/06	9.15	19133.14	0.00	19908.1	25.08	93152	503.00	241.49	2.18	92.01	0.00	8907.65	25.14
31/12/06	9.15	19133.24	0.10	19931.67	23.57	93596	444.00	242.5	1.01	92.01	0.00	8931.26	23.61
Totals			552.01		144.82		-3623410.00		36.02		0.00		744.39
Forward		19133.24		19931.67		93596.00		242.50		92.01		8931.26	

25,662

= 100% monitoring

Bailick 1

Date	Time	INDUSTRIAL PUMPS HOURS RUN				DOMESTIC PUMPS HOURS RUN							STORM PUMPS HOURS RUN						DRAIN PUMPS HOURS RUN				WEIR SI
		Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours
01/01/07	9.00	2952.18	1.66	3695.98	1.58	29599.97	25.13	21655.58	25.13	85.93	0.00	412381	7950.00	242.98	0.40	174.11	0.40	169.61	0.37	361.33	0.00	373.60	0.00	15997.14
02/01/07	9.00	2953.48	1.30	3697.22	1.24	29621.80	21.83	21677.41	21.83	85.93	0.00	419207	6826.00	243.26	0.28	174.39	0.28	169.89	0.28	361.33	0.00	373.60	0.00	16018.96
03/01/07	9.00	2955.75	2.27	3699.39	2.17	29645.86	24.06	21701.47	24.06	85.93	0.00	426586	7379.00	243.49	0.23	174.63	0.24	170.14	0.25	361.33	0.00	373.6	0.00	16043.03
04/01/07	9.00	2958.42	2.67	3701.86	2.47	29670.26	24.40	21725.87	24.40	85.93	0.00	434045	7459.00	243.87	0.38	174.99	0.36	170.5	0.36	361.33	0.00	373.6	0.00	16067.43
05/01/07	9.00	2960.90	2.48	3704.23	2.37	29693.81	23.55	21749.42	23.55	85.93	0.00	441165	7120.00	244.13	0.26	175.25	0.26	170.75	0.25	361.33	0.00	373.6	0.00	16090.97
06/01/07	9.00	2963.13	2.23	3706.32	2.09	29720.37	26.56	21775.98	26.56	85.93	0.00	449174	8009.00	244.42	0.29	175.56	0.31	171.05	0.30	361.33	0.00	373.6	0.00	16117.54
07/01/07	9.00	2965.33	2.20	3708.40	2.08	29744.76	24.39	21800.37	24.39	85.93	0.00	456462	7288.00	244.8	0.38	175.95	0.39	171.42	0.37	361.33	0.00	373.6	0.00	16141.93
08/01/07	9.00	2967.54	2.21	3710.44	2.04	29765.7	20.94	21821.31	20.94	85.93	0.00	462678	6216.00	245.18	0.38	176.34	0.39	171.8	0.38	361.33	0.00	373.6	0.00	16162.87
09/01/07	9.00	2969.82	2.28	3712.64	2.20	29789.76	24.06	21845.37	24.06	85.93	0.00	469901	7223.00	245.59	0.41	176.76	0.42	172.2	0.40	361.33	0.00	373.6	0.00	16186.93
10/01/07	9.00	2972.15	2.33	3714.80	2.16	29813.75	23.99	21869.36	23.99	85.93	0.00	477132	7231.00	245.86	0.27	177.02	0.26	172.48	0.28	361.33	0.00	373.6	0.00	16210.92
11/01/07	9.00	2974.36	2.21	3716.90	2.10	29838.06	24.31	21893.67	24.31	85.93	0.00	484465	7333.00	246.1	0.24	177.24	0.22	172.71	0.23	361.33	0.00	373.6	0.00	16255.23
12/01/07	9.00	2976.41	2.05	3718.86	1.96	29861.86	23.80	21917.47	23.80	85.93	0.00	491821	7356.00	246.26	0.16	177.42	0.18	172.89	0.18	361.33	0.00	373.6	0.00	16259.03
13/01/07	9.00	2978.53	2.12	3720.88	2.02	29888.31	26.45	21943.92	26.45	85.93	0.00	499940	8119.00	246.41	0.15	177.57	0.15	173.04	0.15	361.33	0.00	373.6	0.00	16285.48
14/01/07	9.00	2980.14	1.61	3722.40	1.52	29910.67	22.36	21966.28	22.36	85.93	0.00	506753	6813.00	246.57	0.16	177.73	0.16	173.18	0.14	361.33	0.00	373.6	0.00	16307.84
15/01/07	9.00	2981.73	1.59	3723.88	1.48	29933.7	23.03	21989.31	23.03	85.93	0.00	513798	7045.00	246.67	0.10	177.83	0.10	173.28	0.10	361.33	0.00	373.6	0.00	16330.87
16/01/07	9.00	2983.51	1.78	3725.58	1.70	29957.75	24.05	22013.36	24.05	85.93	0.00	521121	7323.00	246.95	0.28	178.11	0.28	173.58	0.30	361.33	0.00	373.6	0.00	16354.91
17/01/07	9.00	2985.70	2.19	3727.65	2.07	29981.69	23.94	22037.3	23.94	85.93	0.00	528407	7286.00	247.23	0.28	178.4	0.29	173.86	0.28	361.33	0.00	373.6	0.00	16378.86
18/01/07	9.00	2988.27	2.57	3730.10	2.45	30005.7	24.01	22061.31	24.01	85.93	0.00	535392	6985.00	247.75	0.52	178.97	0.57	174.35	0.49	361.33	0.00	373.6	0.00	16402.81
19/01/07	9.00	2990.99	2.72	3732.67	2.57	30030.38	24.68	22085.99	24.68	85.93	0.00	542502	7110.00	248.1	0.35	179.33	0.36	174.7	0.35	361.33	0.00	373.6	0.00	16427.55
20/01/07	9.00	2993.65	2.66	3735.14	2.47	30055.47	25.09	22111.08	25.09	85.93	0.00	549730	7228.00	248.46	0.36	179.68	0.35	175.06	0.36	361.33	0.00	373.6	0.00	16452.64
21/01/07	9.00	2995.96	2.31	3737.35	2.21	30079.77	24.30	22135.38	24.30	85.93	0.00	556735	7005.00	248.75	0.29	179.98	0.30	175.35	0.29	361.33	0.00	373.6	0.00	16476.94
22/01/07	9.00	2998.03	2.07	3739.19	1.84	30101.6	21.83	22157.22	21.84	85.93	0.00	563026	6291.00	249.03	0.28	180.26	0.28	175.62	0.27	361.33	0.00	373.6	0.00	16498.77
23/01/07	9.00	3000.22	2.19	3741.22	2.03	30125.72	24.12	22181.33	24.11	85.93	0.00	569974	6948.00	249.27	0.24	180.5	0.24	175.88	0.26	361.33	0.00	373.6	0.00	16522.89
24/01/07	9.00	3002.27	2.05	3743.24	2.02	30149.77	24.05	22205.38	24.05	85.93	0.00	576908	6934.00	249.44	0.17	180.67	0.17	176.05	0.17	361.33	0.00	373.6	0.00	16546.94
25/01/07	9.00	3004.31	2.04	3745.17	1.93	30173.61	23.84	22229.22	23.84	85.93	0.00	584011	7103.00	249.54	0.10	180.77	0.10	176.13	0.08	361.33	0.00	373.6	0.00	16570.78
26/01/07	9.00	3006.16	1.85	3746.91	1.74	30197.76	24.15	22253.37	24.15	85.93	0.00	591186	7175.00	249.58	0.04	180.81	0.04	176.19	0.06	361.33	0.00	373.6	0.00	16594.93
27/01/07	9.00	3007.95	1.79	3748.62	1.71	30223.32	25.56	22278.93	25.56	85.93	0.00	598864	7678.00	249.66	0.08	180.89	0.08	176.27	0.08	361.33	0.00	373.6	0.00	16620.49
28/01/07	9.00	3009.55	1.60	3750.11	1.49	30248.02	24.70	22303.63	24.70	85.93	0.00	606330	7466.00	249.7	0.04	180.93	0.04	176.3	0.03	361.33	0.00	373.6	0.00	16645.19
29/01/07	9.00	3010.92	1.37	3751.41	1.30	30269.75	21.73	22325.36	21.73	85.93	0.00	612914	6584.00	249.7	0.00	180.93	0.00	176.3	0.00	361.33	0.00	373.6	0.00	16666.91
30/03/08	9.00	3012.59	1.67	3752.99	1.58	30293.89	24.14	22349.49	24.13	85.93	0.00	620231	7317.00	249.7	0.00	180.93	0.00	176.3	0.00	361.33	0.00	373.6	0.00	16691.04
31/03/08	9.00	3014.38	1.79	3754.71	1.72	30317.82	23.93	22373.43	23.94	85.93	0.00	627521	7290.00	249.7	0.00	180.93	0.00	176.3	0.00	361.33	0.00	373.6	0.00	16714.99
Totals			63.86		60.31		742.98		742.98		0.00		223090.00		7.12		7.22		7.06		0.00		0.00	
29/01/07 Forward		3014.38		3754.71		30317.82		22373.43		85.93		627521.00		249.70		180.93		176.30		361.33		373.60		16714.99

Bailick 2

Date	Time	FOUL PUMPS HOURS RUN						STORM PUMPS HOURS RUN				WEIR SECTION	
		Pump 1	Hrs/Day	Pump 2	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day
01/01/07	9.15	19133.24	0.00	19956.80	25.13	94070	474.00	243.61	1.11	92.01	0.00	8956.39	25.13
02/01/07	9.15	19133.24	0.00	19978.66	21.86	94569	499.00	244.32	0.71	92.01	0.00	8978.25	21.86
03/01/07	9.15	19133.24	0.00	20002.71	24.05	95066	497.00	245.13	0.81	92.01	0.00	9002.30	24.05
04/01/07	9.15	19154.98	21.74	20005.40	2.69	95839	773.00	245.96	0.83	92.01	0.00	9026.73	24.43
05/01/07	9.15	19178.49	23.51	20005.40	0.00	96558	719.00	246.68	0.72	92.01	0.00	9050.24	23.51
06/01/07	9.15	19205.06	26.57	20005.40	0.00	96804	246.00	248.03	1.35	92.01	0.00	9076.81	26.57
07/01/07	9.15	19205.10	0.04	20029.75	24.35	97109	305.00	249.38	1.35	92.01	0.00	9101.20	24.39
08/01/07	9.15	19226.02	20.92	20029.80	0.05	97932	823.00	250.04	0.66	92.01	0.00	9122.15	20.95
09/01/07	9.15	19250.10	24.08	20029.80	0.00	98522	590.00	251.12	1.08	92.01	0.00	9146.23	24.08
10/01/07	9.15	19250.10	0.00	20053.73	23.93	98860	338.00	252.14	1.02	92.01	0.00	9170.16	23.93
11/01/07	9.15	19250.10	0.00	20078.08	24.35	99530	670.00	252.70	0.56	92.01	0.00	9194.50	24.34
12/01/07	9.15	19250.10	0.00	20101.86	23.78	100485	955.00	252.91	0.21	92.01	0.00	9218.25	23.75
13/01/07	9.15	19251.99	1.89	20126.43	24.57	101810	1325.00	252.91	0.00	92.01	0.00	9238.25	20.00
14/01/07	9.15	19251.99	0.00	20148.86	22.43	102850	1040.00	252.91	0.00	92.01	0.00	9238.25	0.00
15/01/07	9.15	19251.99	0.00	20171.82	22.96	103326	476.00	253.13	0.22	92.01	0.00	9257.26	19.01
16/01/07	9.15	19251.99	0.00	20195.92	24.10	104412	1086.00	253.49	0.36	92.01	0.00	9281.36	24.10
17/01/07	9.15	19251.99	0.00	20219.82	23.90	105377	965.00	253.82	0.33	92.01	0.00	9305.26	23.90
18/01/07	9.15	19251.99	0.00	20243.81	23.99	106633	1256.00	254.57	0.75	92.01	0.00	9329.25	23.99
19/01/07	9.15	19251.99	0.00	20268.48	24.67	107962	1329.00	254.83	0.26	92.01	0.00	9353.93	24.68
20/01/07	9.15	19251.99	0.00	20293.59	25.11	109198	1236.00	255.35	0.52	92.01	0.00	9379.03	25.10
21/01/07	9.15	19251.99	0.00	20317.90	24.31	110303	1105.00	255.86	0.51	92.01	0.00	9403.34	24.31
22/01/07	9.15	19251.99	0.00	20339.76	21.86	111117	814.00	256.43	0.57	92.01	0.00	9425.20	21.86
23/01/07	9.15	19276.10	24.11	20356.35	16.59	112169	1052.00	256.68	0.25	92.01	0.00	9444.88	19.68
24/01/07	9.15	19276.41	0.31	20380.62	24.27	113434	1265.00	256.68	0.00	92.01	0.00	9463.06	18.18
25/01/07	9.15	19276.41	0.00	20403.88	23.26	114401	967.00	256.70	0.02	92.01	0.00	9463.06	0.00
26/01/07	9.15	19276.41	0.00	20428.01	24.13	115275	874.00	256.70	0.00	92.01	0.00	9483.65	20.59
27/01/07	9.15	19276.41	0.00	20453.59	25.58	116202	927.00	256.70	0.00	92.01	0.00	9509.24	25.59
28/01/07	9.15	19276.41	0.00	20478.30	24.71	117092	890.00	256.70	0.00	92.01	0.00	9533.95	24.71
29/01/07	9.15	19276.41	0.00	20500.00	21.70	117796	704.00	256.70	0.00	92.01	0.00	9555.65	21.70
30/01/07	9.15	19276.41	0.00	20524.18	24.18	118493	697.00	256.70	0.00	92.01	0.00	9579.83	24.18
31/01/07	9.15	19276.41	0.00	20548.09	23.91	118817	324.00	257.11	0.41	92.01	0.00	9603.74	23.91
Totals			143.17		616.42		25221.00		14.61		0.00		672.48
Forward		19276.41		20548.09		118817.00		257.11		92.01		9603.74	

ECTION	STORM TANK LEVELS		
Hrs/Day	Cell 1	Cell 2	Cell 3
25.13	4.13	4.05	4.09
21.82	4.12	3.94	3.98
24.07	4.13	3.94	3.98
24.40	4.13	3.97	4.01
23.54	4.14	3.98	4.02
26.57	4.14	3.97	4.01
24.39	4.22	4.23	4.26
20.94	4.26	4.26	4.3
24.06	4.13	4.06	4.1
23.99	4.13	3.94	3.98
44.31	4.13	3.97	4.01
3.80	4.13	3.9	3.94
26.45	4.13	3.97	4.01
22.36	4.06	3.87	3.91
23.03	4.07	3.88	3.91
24.04	4.12	3.91	3.95
23.95	4.12	3.95	3.99
23.95	4.2	4.2	4.24
24.74	4.13	4	4.04
25.09	4.13	4.03	4.07
24.30	4.14	3.98	4.02
21.83	4.13	3.97	4.01
24.12	4.13	3.96	4
24.05	4.12	3.89	3.93
23.84	3.91	3.87	3.91
24.15	3.85	3.85	3.89
25.56	3.94	3.84	3.88
24.70	3.8	3.79	3.82
21.72	3.7	3.72	3.76
24.13	3.5	3.5	3.54
23.95	3.32	3.32	3.36
742.98			

Bailick 1

		INDUSTRIAL PUMPS HOURS RUN				DOMESTIC PUMPS HOURS RUN								STORM PUMPS HOURS RUN						DRAIN PUMPS HOURS RUN				WEIR SECTION		STORI
Date	Time	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day	Cell 1
01/02/07	9.00	3016.29	1.91	3756.49	1.78	30341.73	23.91	22397.34	23.91	85.93	0.00	634802	7281.00	249.70	0.00	180.93	0.00	176.30	0.00	361.33	0.00	373.60	0.00	16715.25	0.26	2.98
02/02/07	9.00	3018.30	2.01	3758.41	1.92	30365.57	23.84	22421.13	23.79	85.93	0.00	641522	6720.00	249.70	0.00	180.93	0.00	176.30	0.00	361.33	0.00	373.60	0.00	16715.25	0.00	3.73
03/02/07	9.00	3020.28	1.98	3760.30	1.89	30380.01	14.44	22432.60	11.47	85.93	0.00	647884	6362.00	249.79	0.09	181.03	0.10	176.40	0.10	361.33	0.00	373.60	0.00	16736.85	21.60	4.13
04/02/07	9.00	3022.09	1.81	3761.98	1.68	30380.01	0.00	22456.79	24.19	85.93	0.00	654416	6532.00	249.89	0.10	181.12	0.09	176.5	0.10	361.33	0.00	373.60	0.00	16761.03	24.18	3.97
05/02/07	9.00	3023.66	1.57	3763.46	1.48	30380.01	0.00	22478.64	21.85	85.93	0.00	660318	5902.00	249.95	0.06	181.16	0.04	176.54	0.04	361.33	0.00	373.60	0.00	16782.88	21.85	3.87
06/02/07	9.00	3025.43	1.77	3765.14	1.68	30380.01	0.00	22502.93	24.29	85.93	0.00	666880	6562.00	250.01	0.06	181.22	0.06	176.59	0.05	361.33	0.00	373.60	0.00	16807.17	24.29	3.87
07/02/07	9.00	3027.63	2.20	3767.24	2.10	30380.01	0.00	22526.88	23.95	85.93	0.00	673349	6469.00	250.03	0.02	181.26	0.04	176.63	0.04	361.33	0.00	373.60	0.00	16831.12	23.95	3.84
08/02/07	9.00	3030.57	2.94	3769.80	2.56	30387.21	7.20	22539.33	12.45	85.93	0.00	678313	4964.00	250.71	0.68	181.9	0.64	177.28	0.65	361.33	0.00	373.60	0.00	16850.98	19.86	4.17
09/02/07	9.00	3033.48	2.91	3772.48	2.68	30387.21	0.00	22563.33	24.00	85.93	0.00	684796	6483.00	251.01	0.30	182.19	0.29	177.55	0.27	361.33	0.00	373.60	0.00	16874.98	24.00	4.13
10/02/07	9.00	3036.09	2.61	3774.92	2.44	30387.21	0.00	22590.4	27.07	85.93	0.00	692107	7311.00	251.22	0.21	182.41	0.22	177.78	0.23	361.33	0.00	373.60	0.00	16883.23	8.25	4.13
11/02/07	9.00	3037.90	1.81	3776.63	1.71	30387.21	0.00	22611.79	21.39	85.93	0.00	697887	5780.00	251.42	0.20	182.61	0.20	177.96	0.18	361.33	0.00	373.60	0.00	16883.23	0.00	4.12
12/02/07	9.00	3039.92	2.02	3778.55	1.92	30387.21	0.00	22635.31	23.52	85.93	0.00	704238	6351.00	251.62	0.20	182.81	0.20	178.16	0.20	361.33	0.00	373.60	0.00	16883.23	0.00	4.12
13/02/07	9.00	3041.82	1.90	3780.35	1.80	30387.21	0.00	22659.15	23.84	85.93	0.00	710680	6442.00	251.71	0.09	182.91	0.10	178.25	0.09	361.33	0.00	373.60	0.00	16883.23	0.00	4.12
14/02/07	9.00	3044.40	2.58	3782.79	2.44	30387.21	0.00	22683.2	24.05	85.93	0.00	717175	6495.00	251.83	0.12	183.03	0.12	178.39	0.14	361.33	0.00	373.60	0.00	16883.28	0.05	4.12
15/02/07	9.00	3046.82	2.42	3785.12	2.33	30387.23	0.02	22706.06	24.86	85.93	0.00	723490	6315.00	251.89	0.06	183.15	0.12	178.75	0.36	361.33	0.00	373.60	0.00	16883.28	0.00	4.32
16/02/07	9.00	3049.97	3.15	3787.92	2.80	30387.44	0.21	22729.85	21.79	85.98	0.05	729806	6316.00	251.89	0.00	184.05	0.90	178.86	0.11	361.33	0.00	373.60	0.00	16883.3	0.02	4.13
17/02/07	9.00	3052.89	2.92	3790.66	2.74	30387.44	0.00	22755.62	25.77	85.99	0.01	736777	6971.00	251.89	0.00	184.35	0.30	178.93	0.07	361.33	0.00	373.60	0.00	16883.3	0.00	4.12
18/02/07	9.00	3055.59	2.70	3793.19	2.53	30387.44	0.00	22779.56	23.94	85.99	0.00	743248	6471.00	251.89	0.00	184.5	0.15	179.03	0.10	361.33	0.00	373.60	0.00	16883.3	0.00	4.12
19/02/07	9.00	3059.35	3.76	3796.59	3.40	30387.44	0.00	22803.16	23.60	85.99	0.00	749605	6357.00	251.89	0.00	186.48	1.98	179.6	0.57	361.33	0.00	373.60	0.00	16883.3	0.00	4.29
20/02/07	9.00	3064.73	5.38	3801.57	4.98	30410.66	23.22	22803.26	0.10	85.99	0.00	756084	6479.00	251.89	0.00	189.69	3.21	180.55	0.95	361.33	0.00	373.6	0.00	16883.3	0.00	4.26
21/02/07	9.00	3069.04	4.31	3805.47	3.90	30433.26	22.60	22803.26	0.00	85.99	0.00	762261	6177.00	251.89	0.00	191.32	1.63	181.09	0.54	361.33	0.00	373.6	0.00	16883.31	0.01	4.24
22/02/07	9.00	3073.96	4.92	3810.13	4.66	30458.49	25.23	22803.26	0.00	85.99	0.00	769199	6938.00	251.89	0.00	194.37	3.05	182.02	0.93	361.33	0.00	373.6	0.00	16883.31	0.00	4.27
23/02/07	9.00	3077.59	3.63	3813.51	3.38	30482.44	23.95	22803.26	0.00	85.99	0.00	775718	6519.00	251.89	0.00	196	1.63	182.55	0.53	361.33	0.00	373.6	0.00	16883.81	0.50	4.27
24/02/07	9.00	3080.81	3.22	3816.55	3.04	30507.94	25.50	22803.26	0.00	85.99	0.00	782482	6764.00	251.89	0.00	197.88	1.88	183.15	0.60	361.33	0.00	373.6	0.00	16883.81	0.00	4.25
25/02/07	9.00	3083.21	2.40	3818.79	2.24	30531.67	23.73	22803.26	0.00	85.99	0.00	788532	6050.00	251.89	0.00	198.31	1.43	183.58	0.43	361.33	0.00	373.6	0.00	16883.81	0.00	4.24
26/02/07	9.00	3085.11	1.90	3820.62	1.83	30552.92	21.25	22803.26	0.00	85.99	0.00	794000	5468.00	251.89	0.00	200.18	0.87	183.85	0.27	361.33	0.00	373.6	0.00	16883.81	0.00	4.14
27/02/07	9.00	3087.51	2.40	3822.89	2.27	30555.17	2.25	22825.07	21.81	85.99	0.00	800752	6752.00	252.29	0.40	200.63	0.45	184.25	0.40	361.33	0.00	373.6	0.00	16883.81	0.00	4.14
28/02/07	9.00	3089.97	2.46	3825.18	2.29	30555.2	0.03	22848.88	23.81	85.99	0.00	807630	6878.00	252.59	0.30	200.92	0.29	184.56	0.31	361.33	0.00	373.6	0.00	16884.14	0.33	4.14
Totals			75.59		70.47		237.38		475.45		0.06		180109.00		2.89		19.99		8.26		0.00		0.00		169.15	
28/02/07 Forward		3089.97		3825.18		30555.20		22848.88		85.99		807630.00		252.59		200.92		184.56		361.33		373.60		16884.14		

Bailick 2

		FOUL PUMPS HOURS RUN						STORM PUMPS HOURS RUN				WEIR SECTION		
Date	Time	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Flow Meter	Daily Flow	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day	
01/02/07	9.15	19276.41	0.00	20571.99	23.90	119139	322.00	257.67	0.58	92.01	0.00	9827.84	23.90	
02/02/07	9.15	19276.41	0.00	20595.85	23.86	119466	327.00	258.21	0.54	92.01	0.00	9851.50	23.66	
03/02/07	9.15	19276.41	0.00	20821.33	25.48	120349	883.00	258.36	0.15	92.01	0.00	9877.42	25.92	
04/02/07	9.15	19276.41	0.00	20845.55	24.22	121140	791.00	258.58	0.22	92.01	0.00	9701.64	24.22	
05/02/07	9.15	19276.41	0.00	20867.36	21.81	121631	491.00	259.00	0.42	92.01	0.00	9723.44	21.80	
06/02/07	9.15	19276.41	0.00	20891.73	24.37	122283	652.00	259.37	0.37	92.01	0.00	9747.81	24.37	
07/02/07	9.15	19276.41	0.00	20915.64	23.91	123220	937.00	259.55	0.18	92.01	0.00	9770.34	22.53	
08/02/07	9.15	19276.41	0.00	20938.67	24.03	123380	160.00	262.07	2.52	92.01	0.00	9794.37	24.03	
09/02/07	9.15	19276.41	0.00	20962.66	22.99	124213	833.00	262.45	0.38	92.01	0.00	9818.36	23.99	
10/02/07	9.15	19276.41	0.00	20769.73	27.07	125194	981.00	262.87	0.42	92.01	0.00	9845.44	27.08	
11/02/07	9.15	19276.41	0.00	20944.12	21.39	125935	741.00	263.16	0.29	92.01	0.00	9866.82	21.38	
12/02/07	9.15	19276.41	0.00	20834.7	23.58	126392	457.00	263.86	0.70	92.01	0.00	9890.40	23.58	
13/02/07	9.15	19276.41	0.00	20858.56	23.86	127294	902.00	263.89	0.03	92.01	0.00	9914.26	23.86	
14/02/07	9.15	19276.41	0.00	20882.56	24.00	127405	111.00	264.57	0.68	92.01	0.00	9938.26	24.00	
15/02/07	9.15	19276.41	0.00	20908.1	25.54	128249	844.00	264.81	0.24	92.01	0.00	9964.41	26.15	
16/02/07	9.15	19276.41	0.00	20932.25	24.15	128743	494.00	266.15	1.34	92.01	0.00	9987.97	23.56	
17/02/07	9.15	19276.41	0.00	20956.97	24.72	129652	909.00	266.61	0.46	92.01	0.00	10013.21	25.24	
18/02/07	9.15	19276.41	0.00	20980.93	23.96	129677	225.00	267.77	1.16	92.01	0.00	10037.18	23.97	
19/02/07	9.15	19276.41	0.00	21004.34	23.41	129924	47.00	270.53	2.76	92.01	0.00	10060.57	23.41	
20/02/07	9.15	19276.41	0.00	21025.13	20.79	130399	415.00	273.7	3.17	92.01	0.00	10084.06	23.49	
21/02/07	9.15	19276.41	0.00	21047.32	22.19	130752	413.00	275.53	1.83	92.01	0.00	10106.66	22.60	
22/02/07	9.15	19276.41	0.00	21073.53	26.21	131670	918.00	278.21	2.68	92.01	0.00	10132.87	26.21	
23/02/07	9.15	19276.41	0.00	21096.51	22.98	132503	833.00	279.47	1.26	92.01	0.00	10155.85	22.98	
24/02/07	9.15	19276.41	0.00	21122.02	25.51	133429	926.00	280.65	1.18	92.01	0.00	10181.35	25.50	
25/02/07	9.15	19276.41	0.00	21145.44	23.42	134165	736.00	281.28	0.63	92.01	0.00	10204.78	23.43	
26/02/07	9.15	19276.41	0.00	21166.98	21.54	134652	487.00	281.76	0.48	92.01	0.00	10226.31	21.53	
27/02/07	9.15	19276.41	0.00	21191.08	24.10	135116	464.00	282.39	0.63	92.01	0.00	10250.41	24.10	
28/02/07	9.15	19276.41	0.00	21214.98	23.90	135819	703.00	282.84	0.45	92.01	0.00	10274.32	23.91	
Totals			0.00		666.89		17002.00		25.73		0.00		670.58	
Forward		19276.41		21214.98		135819.00		282.84		92.01		10274.32		

M TANK LEVELS	
Cell 2	Cell 3
2.99	3.03
2.99	3.03
3.99	4.03
3.87	3.91
3.85	3.89
3.84	3.88
3.81	3.85
4.17	4.21
3.98	4.03
3.99	4.03
3.92	3.96
3.9	3.94
3.88	3.92
3.88	3.92
4.32	4.36
4.13	4.09
4.1	3.94
3.9	3.94
4.3	4.34
4.26	4.3
4.24	4.28
4.28	4.31
4.27	4.31
4.25	4.28
4.24	4.31
4.06	4.1
4.02	4.06
4	4.04

Bailick 1

		INDUSTRIAL PUMPS HOURS RUN				DOMESTIC PUMPS HOURS RUN						
Date	Time	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Flow Meter
01/03/07	9.00	3092.47	2.50	3827.54	2.36	30555.20	0.00	22872.96	24.08	86.03	0.04	814554
02/03/07	9.00	3095.06	2.59	3830.00	2.46	30555.27	0.07	22897.13	24.17	86.03	0.00	821503
03/03/07	9.00	3098.93	3.87	3833.63	3.63	30560.78	5.51	22921.83	24.70	86.03	0.00	829099
04/03/07	9.00	3102.20	3.27	3836.67	3.04	30579.79	19.01	22927.21	5.38	86.03	0.00	835877
05/03/07	9.00	3105.29	3.09	3839.57	2.90	30592.81	13.02	22936.81	9.60	86.03	0.00	842199
06/03/07	9.00	3109.60	4.31	3843.63	4.06	30612.66	19.85	22944.64	7.83	86.03	0.00	849208
07/03/07	9.00	3113.49	3.89	3847.28	3.65	30637.3	24.64	22944.64	0.00	86.07	0.04	856236
08/03/07	9.00	3116.94	3.45	3850.52	3.24	30637.33	0.03	22968.79	24.15	86.07	0.00	863019
09/03/07	9.00	3119.77	2.83	3853.15	2.63	30637.33	0.00	22992.54	23.75	86.07	0.00	869492
10/03/07	9.00	3122.59	2.82	3855.84	2.69	30639.76	2.43	23017.84	25.30	86.07	0.00	876394
11/03/07	9.00	3125.19	2.60	3858.25	2.41	30639.76	0.00	23041.41	23.57	86.07	0.00	883351
12/03/07	9.00	3127.37	2.18	3860.34	2.09	30639.76	0.00	23064.77	23.36	86.07	0.00	889129
13/03/07	9.00	3129.60	2.23	3862.45	2.11	30643.96	4.20	23088.76	23.99	86.07	0.00	895931
14/03/07	9.00	3132.04	2.44	3864.74	2.29	30667.37	23.41	23089.39	0.63	87.06	0.99	903081
15/03/07	9.00	3134.32	2.28	3866.86	2.12	30691.34	23.97	23089.39	0.00	87.06	0.00	910242
16/03/07	9.00	3136.56	2.24	3869.00	2.14	30715.5	24.16	23089.58	0.19	86.07	-0.99	917458
17/03/07	9.00	3138.70	2.14	3871.00	2.00	30739.72	24.22	23089.58	0.00	86.07	0.00	924680
18/03/07	9.00	3140.99	2.29	3873.18	2.18	30765.51	25.79	23089.58	0.00	86.07	0.00	932391
19/03/07	9.00	3143.17	2.18	3875.23	2.05	30788.75	23.24	23089.58	0.00	86.07	0.00	939321
20/03/07	9.00	3145.38	2.21	3877.28	2.05	30811.37	22.62	23089.58	0.00	86.07	0.00	945905
21/03/07	9.00	3147.88	2.50	3879.67	2.39	30835.19	23.82	23089.58	0.00	86.07	0.00	952775
22/03/07	9.00	3150.78	2.90	3882.35	2.68	30859.34	24.15	23089.58	0.00	86.07	0.00	959635
23/03/07	9.00	3153.61	2.83	3884.47	2.12	30881.29	21.95	23089.58	0.00	86.07	0.00	965860
24/03/07	9.00	3155.71	2.10	3886.99	2.52	30908.44	27.15	23089.58	0.00	86.07	0.00	973533
25/03/07	9.00	3157.07	1.36	3888.25	1.26	30935.21	26.77	23089.58	0.00	86.07	0.00	981723
26/03/07	9.00	3159.38	2.31	3890.48	2.23	30954.25	19.04	23089.58	0.00	86.07	0.00	986587
27/03/07	9.00	3161.02	1.64	3892.06	1.58	30976.76	22.51	23089.97	0.39	86.07	0.00	992854
28/03/07	9.00	3163.30	2.28	3894.22	2.16	30989.62	12.86	23101.18	11.21	86.07	0.00	998022
29/03/07	9.00	3165.21	1.91	3896.03	1.81	30997.31	7.69	23117.43	16.25	86.07	0.00	1004801
30/03/07	9.00	3167.07	1.86	3897.76	1.73	30997.31	0.00	23141.55	24.12	86.07	0.00	1011574
31/03/07	9.00	3169.01	1.94	3899.60	1.84	30997.36	0.05	23165.88	24.33	86.07	0.00	1018255
Totals			**79.04**		**74.42**		**442.16**		**317.00**		**0.08**	
31/03/07 Forward		3169.01		3899.60		30997.36		23165.88		86.07		1018255.00

Daily Flow	STORM PUMPS HOURS RUN						DRAIN PUMPS HOURS RUN				WEIR SECTION		STORI
	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Pump 3	Hrs/Day	Pump 1	Hrs/Day	Pump 2	Hrs/Day	Hours	Hrs/Day	Cell 1
6924.00	252.88	0.29	201.22	0.30	184.83	0.27	361.33	0.00	373.60	0.00	16884.14	0.00	4.13
6949.00	253.14	0.26	201.49	0.27	185.10	0.27	361.33	0.00	373.60	0.00	16884.52	0.38	4.32
7596.00	254.08	0.94	202.50	1.01	186.07	0.97	361.33	0.00	373.60	0.00	16884.52	0.00	4.13
6778.00	254.78	0.70	203.21	0.71	186.77	0.70	361.33	0.00	373.60	0.00	16884.52	0.00	4.28
6322.00	255.37	0.59	203.79	0.58	187.33	0.56	361.33	0.00	373.60	0.00	16884.52	0.00	4.15
7009.00	256.89	1.52	205.36	1.57	188.82	1.49	361.33	0.00	373.60	0.00	16884.52	0.00	4.27
7028.00	257.79	0.90	206.25	0.89	189.71	0.89	361.33	0.00	373.60	0.00	16884.52	0.00	4.26
6783.00	258.4	0.61	206.94	0.69	190.34	0.63	361.33	0.00	373.60	0.00	16884.59	0.07	4.15
6473.00	258.99	0.59	207.53	0.59	190.93	0.59	361.33	0.00	373.60	0.00	16884.59	0.00	4.14
6902.00	259.45	0.46	208	0.47	191.37	0.44	361.33	0.00	373.60	0.00	16884.6	0.01	4.14
6957.00	259.84	0.39	208.4	0.40	191.78	0.41	361.33	0.00	373.60	0.00	16884.6	0.00	4.14
5778.00	260.33	0.49	208.91	0.51	192.26	0.48	361.33	0.00	373.60	0.00	16884.6	0.00	4.14
6802.00	260.66	0.33	209.25	0.34	192.59	0.33	361.33	0.00	373.60	0.00	16884.62	0.02	4.13
7150.00	260.84	0.18	209.44	0.19	192.77	0.18	361.33	0.00	373.60	0.00	16884.62	0.00	4.13
7161.00	260.95	0.11	209.56	0.12	192.88	0.11	361.33	0.00	373.60	0.00	16884.62	0.00	4.12
7216.00	261.03	0.08	209.64	0.08	192.96	0.08	361.33	0.00	373.60	0.00	16884.62	0.00	4.12
7222.00	261.09	0.06	209.7	0.06	193.04	0.08	361.33	0.00	373.60	0.00	16884.62	0.00	4.12
7711.00	261.14	0.05	209.75	0.05	193.08	0.04	361.33	0.00	373.60	0.00	16884.62	0.00	4.12
6930.00	261.26	0.12	209.85	0.10	193.19	0.11	361.33	0.00	373.60	0.00	16884.62	0.00	4.12
6584.00	261.32	0.06	209.91	0.06	193.25	0.06	361.33	0.00	373.6	0.00	16884.62	0.00	4.12
6870.00	261.38	0.06	209.99	0.08	193.31	0.06	361.33	0.00	373.6	0.00	16884.62	0.00	4.12
6860.00	261.42	0.04	210.03	0.04	193.37	0.06	361.33	0.00	373.6	0.00	16884.65	0.03	4.12
6225.00	261.45	0.03	210.07	0.04	193.41	0.04	361.33	0.00	373.6	0.00	16884.65	0.00	4.12
7673.00	261.49	0.04	210.09	0.02	193.42	0.01	361.33	0.00	373.6	0.00	16884.65	0.00	4.12
8190.00	261.51	0.02	210.11	0.02	193.44	0.02	361.33	0.00	373.6	0.00	16884.65	0.00	4.13
4864.00	261.51	0.00	210.12	0.01	193.44	0.00	361.33	0.00	373.6	0.00	16884.65	0.00	4.02
6267.00	261.51	0.00	210.12	0.00	193.46	0.02	361.33	0.00	373.6	0.00	16884.65	0.00	4.12
5168.00	261.69	0.18	210.28	0.16	193.62	0.16	361.33	0.00	373.6	0.00	16884.65	0.00	4.13
6779.00	261.73	0.04	210.34	0.06	193.68	0.06	361.33	0.00	373.6	0.00	16884.65	0.00	3.67
6773.00	261.73	0.00	210.34	0.00	193.68	0.00	361.33	0.00	373.6	0.00	16884.65	0.00	3.38
6681.00	261.75	0.02	210.34	0.00	193.68	0.00	361.33	0.00	373.6	0.00	16884.65	0.00	3.09
210625.00		**9.16**		**9.42**		**9.12**		**0.00**		**0.00**		**0.51**	
	261.75		210.34		193.68		361.33		373.60		16884.65		

M TANK LEVELS	
Cell 2	Cell 3
3.98	4.01
4.32	4.35
4.02	4.06
4.28	4.32
4.15	4.19
4.27	4.31
4.26	4.3
4.15	4.19
4.13	4.17
4.06	4.1
4.1	4.14
4.13	4.17
3.98	4.02
3.89	3.93
3.89	3.92
3.89	3.92
3.89	3.92
3.88	3.92
3.89	3.93
3.89	3.93
3.88	3.92
3.89	3.93
3.88	3.92
3.88	3.92
3.88	3.92
3.88	3.91
3.9	3.93
4.12	4.15
3.69	3.73
3.37	3.41
3.09	3.12

Certification of compliance of Midleton WWTP with EU Directive and Irish Regulations.

Month	
Jan-02	No certification made
Feb-02	No certification made
Mar-02	No certification made
Apr-02	"The plant achieved compliance with EU Directive and Irish Regulations....."
May-02	"Achieved compliance with EU Directive and Irish Regulations."
Jun-02	"Achieved compliance with EU Directive and Irish Regulations."
Jul-02	"Achieved compliance with EU Directive and Irish Regulations."
Aug-02	"Achieved compliance with EU Directive and Irish Regulations."
Sep-02	"Achieved compliance with EU Directive and Irish Regulations."
Oct-02	"Achieved compliance with EU Directive and Irish Regulations."
Nov-02	"Achieved compliance with EU Directive and Irish Regulations."
Dec-02	"Achieved compliance with EU Directive and Irish Regulations."
Jan-03	"Achieved compliance with EU Directive and Irish Regulations."
Feb-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Mar-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Apr-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
May-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Jun-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Jul-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Aug-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Sep-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Oct-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Nov-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Dec-03	However, the plant achieved compliance with EU Directive and Irish Regulations."
Jan-04	However, the plant achieved compliance with EU Directive and Irish Regulations."
Feb-04	However, the plant achieved compliance with EU Directive and Irish Regulations."
Mar-04	However, the plant achieved compliance with EU Directive and Irish Regulations."
Apr-04	However, the plant achieved compliance with EU Directive and Irish Regulations."
May-04	However, the plant achieved compliance with EU Directive and Irish Regulations."
Jun-04	However, the plant achieved compliance with EU Directive and Irish Regulations."
8th July-04	EPA wrote to Cork CC and recommended 1) upgrading the plant 2) optimising the operation and 3) randomising the sampling regime.
16th July-04	We wrote further to the EPA (which will have been passed on to Cork CC) " There is one further point that strikes us, which is the question of trust that we need to place in the Plant Operator's Reports. The Operator has to be trusted to report wholly and truthfully what is going on, otherwise, in a case like ours, with a discharge to shellfish waters, people could be made ill - and, unfortunately, many have been made ill. "I think that you are in some agreement with my consulting engineer that the plant cannot treat some of the loads that are reported to be arriving. He regards the plant as being totally inadequate in every area, with no possibility that it can be producing the quite excellent results that are quoted by the Operator (EPS) every month and he feels that it is dangerously misleading to all of us that each report should be signed off, "However, the plant achieved compliance with EU Directive and Irish Regulations." The effluent just cannot be meeting these standards."
Jul-04	No certification offered by the Plant Operator
Aug-04	No certification offered by the Plant Operator

Sep-04	No certification offered by the Plant Operator
Oct-04	"Analysing the External analysis results, the Wastewater Treatment Plant has met with all relevant standards as per the associated license during the month of October 2004."
Nov-04	"Analysing the External analysis results, the Wastewater Treatment Plant has met with all relevant standards as per the associated license during the month of November 2004."
Dec-04	"Analysing the External analysis results, the Wastewater Treatment Plant has met with all relevant standards as per the associated license during the month of December 2004."
Jan-05	"Analysing the External analysis results, the Wastewater Treatment Plant has met with all relevant standards as per the associated license during the month of January 2005."

This is the wording that has been retained to date (2008)

Water Quality Consenting
Standard
Disinfection of Sewage Discharges into Controlled Waters

Number:	EAS/2301/3/15	**Status:**	V.2	**Issue Date:**	

Document Owner: **Document Author:**	Richard Brook Keith Davis	**Post:** **Post:**	Acting Discharge Control Process Manager Policy Advisor
Approved by: (as set out in Schedule B of the NFSoD)	Martin Griffiths	**Post:**	Head of Water Quality

If you have any queries relating to the content of this document, or suggestions for improvements, please *contact the Document Owner named above.*

If any term or acronym used in this document is unfamiliar you might find the definition in the Glossary, on the Agency's Intranet site:
Information Resources > Glossary of Terms and Acronyms.

- the INTERIM (ie pending construction of a long-term scheme) use of disinfection techniques for crude, primary, and secondary treated effluents and storm overflows (ref 180_01 Water Quality Consenting Standard "Consenting disinfection systems – minimum pathogen removal requirements").

5. SCOPE

5.1 Disinfection techniques to which the Guidance Applies

The major candidate techniques which are covered in this document are:

- ultra violet irradiation (UV), micro-filtration and chlorination (chlorine or hypochlorite) and.

Other techniques such as:

- chemically assisted sedimentation (CAS), reed beds, constructed wetlands, or lagoons, are also covered where these are used for the purposes of disinfection.

Techniques which have also been appraised but are not currently of significant interest to dischargers include:

- peroxyacetic acid (PAA), chlorine dioxide, ozone, and excess lime (eg Clariflow).

5.2 Discharges to which the Guidance Applies

The guidance applies to new or altered consents for intermittent and continuous discharges of disinfected sewage, sewage effluent, and sewage contaminated surface water, which impact on the quality of waters to which microbiological quality standards are applied. It also applies to the use of chemical addition disinfection techniques for treatment of discharges of sewage to any controlled water, where the principal aim is the disinfection of discharges.

6. POLICY

6.1 The Environment Agency's preference is for continuous and intermittent discharges to be remote from user areas.

A discharge of sewage effluent which is remote from the user area (Bathing or Shellfish Waters) will normally be preferred to one which is direct into such an area. Wherever a discharge is ultimately located, the needs of the receiving environment and the users of that location must be taken fully into consideration (ref 169_01 Water Quality Consenting Standard "Consenting discharges to achieve the requirements of the Shellfish Waters Directive (Microbial Quality)"; EAS/2301/3/19 Water Quality Consenting Standard "Consenting Discharges Affecting Bathing Waters".

Where disinfection is adopted as a long-term solution to poor water quality, the discharger must demonstrate that at least an equivalent degree of environmental protection of the water will be achieved as would be afforded by relocation of the discharge to a more remote point. This does not imply that dischargers will be required to undertake the detailed design of a remote outfall, but rather to demonstrate that the water quality

resulting from the disinfection scheme will be as good as that implied by the EC Directive requirements, as translated into national law, and of a variability no worse than would be expected from a remote solution. Transferring a discharge to a remote location will reduce pathogens in waters through dilution, mortality, and other factors. The closer the outfall the greater the risk of water contamination if the disinfection technique fails. Disinfection is an addition or alternative to long outfall or outfall relocation solutions for achieving desired microbiological quality, but as such it must not lessen the degree of environmental protection afforded.

For long-term use, seasonal disinfection may be acceptable where the Environment Agency is satisfied that there are no clear benefits to ecological or human interests in maintaining the dosing/application system continuously (ref 179_01 Water Quality Consenting Standard "Assessment of the acceptability of seasonal wastewater disinfection").

Methods used by dischargers to achieve any given water quality standards will need to be based on an analysis of the environmental and financial benefit and cost, and of risk of treatment failure, both for discharger and environment. Solutions need to be cost effective and compatible with regulatory and monitoring requirements. Each solution will be unique to a particular location and scheme.

Public health issues will need to be taken into account in agreeing the right solution for the particular circumstances. This will require close liaison by the Environment Agency with regulators responsible for public health, eg Environmental Health Officers.

6.2 <u>In order to achieve appropriate microbiological quality in controlled waters the Environment Agency will give consent to discharges of sewage that have been disinfected using approved techniques.</u>

The Environment Agency will normally control the use of disinfection for sewage effluents through the issue of discharge consents.

In particular the Environment Agency will judge agreement to consent against the following:

- How effective is the technique against the common indicator bacteria (faecal and total coliforms) present in sewage?

- How effective is the technique against specific more robust microorganisms? For example, these may include faecal streptococci, salmonellae, representative enteroviruses and F+ coliphages.

- Are adverse side effects on bathers or aquatic fauna and flora, from the disinfectant or its by- products, absent in appropriate validated tests?

- Are residual by-products known or likely to be produced which are persistent in the environment, or are likely to be accumulated by aquatic organisms?

- How consistent and reliable is the technique?

The Environment Agency will therefore consent measurable disinfection technique variables, which, through the trials programme, have been demonstrated to directly affect

it is important to recognise that for certain disinfection techniques a proportion of coliform organisms may become "re-activated" after the disinfected effluent has been discharged to the receiving water.

C.3 Strategies to Effect Target Reduction

Where disinfection is to be used as the means of achieving protection of bathing waters, a reduction in the region of 25,000 fold (2.5×10^4) will be required for indicators and target potential pathogens. This reduction may be achieved through a combination of on-land treatment, (including disinfection) and dilution, dispersion and mortality in the receiving water.

C.4 Potential Pathogens

To ensure a commensurate reduction in the concentration of potentially pathogenic organisms, account must be taken of the nominal 2.5×10^4 reduction implied for all sewage derived micro-organisms in the Bathing Water Directive's mandatory standards for faecal coliforms. Similarly, the target for reduction of faecal coliforms in discharges to Shellfish Waters of 5.25 log should be taken as the guide for Shellfish Waters Directive schemes. The basic principle to be followed, therefore, is that the siting and design of a discharge, together with the reduction of potential pathogens achieved through on-land treatment (including disinfection), should amount in total to a factor of at least 25,000 fold for Bathing Waters and 178,000 fold for Shellfish Waters. For the purposes of design and consent determination, specific account should be taken of reductions achievable for faecal and total coliforms, faecal streptococci, salmonellae, enteroviruses and F+ coliphages. Table C.1 provides illustrative examples of the effect of different outfall locations on reduction factors for pathogens for Bathing Waters. A minimum one log removal of Enterovirus through the disinfection process is the fundamental requirement for satisfactory pathogen removal (ref : 180_01 Water Quality Consenting Standard : "Consenting Disinfection Systems – Minimum Pathogen Removal requirements").

C.5 Procedure for Trials Consents

For trials, the temporary consent (or letter of agreement) will specify the following, in addition to the normal outlet and discharge quality conditions:

- the nature of the disinfection technique;
- the volume of effluent; and
- the monitoring programme for disinfection technique evaluation (see Appendix A).

As the purpose of the trial is to evaluate disinfection efficiency, dose rates or microbiological limits should not be set.

C.6 Procedure for Interim or Long Term Consents

For interim or long-term consents, the Environment Agency will advise the discharger (in writing) of the required level of reduction to be achieved, for the target (indicator and pathogenic) microbial organisms, between the influent sewage and the water requiring protection (eg the bathing water monitoring point). For "use" waters, the level of reduction

(8b)

4 DETAIL OF 'INTERIM' APPROACH

As a pre-requisite for consideration for reduced monitoring under the 'interim' approach the Discharger must meet all of the following requirements for each works under review:

1. The complete set of microbiological monitoring data, in line with the consent conditions, has been collected and reported for a minimum two year period to the Agency's satisfaction.
2. All data and maintenance reporting requirements, including UV dose reporting where required, have been completed as set out in the discharge consent.
3. All conditions relating to the provision of disinfection in the discharge consent are being complied with.

In line with the full risk based approach the 'interim' approach makes use of High, Medium and Low risk groupings which are defined as follows:

4.1 High Risk

- Substantiated evidence of Mandatory Bathing Water quality standard (coliforms) exceedences linked to treatment problems that are "confirmed" and remain uncorrected.
- From the design information for the discharge, compliance with the Mandatory Bathing Water quality standard for faecal and/or total coliforms cannot be maintained without UV disinfection.
- Discharges directly into or in close proximity to designated Shellfish Waters under the Shellfish Waters Directive.

4.2 Medium Risk

- From the design information for the discharge, compliance with the Mandatory Bathing Water quality standard for faecal and/or total coliforms can be maintained without UV disinfection but compliance with the Guideline standards (faecal coliforms and faecal streptococci) cannot.
- The disinfection plant achieves design target reductions for microbiological determinands.
- The discharge does not impact on Shellfish Waters.

4.3 Low Risk

- There is no requirement for disinfection in order to achieve Bathing Water Guideline and Imperative standards as required under the Bathing Waters Policy [EAS/2301/3/19].
- The discharge does not impact on Shellfish Waters.

Once the pre-requisite conditions have been met, the following microbiological monitoring requirements will be required according to the risk categories shown above.

4.4 Monitoring Requirements

Discharges affecting Bathing Waters

- No crude influent sampling of Total Coliforms, Faecal Coliforms and Faecal Streptococci for UV Disinfection plants where the appropriate 2 log reduction through secondary treatment has been demonstrated during the initial two year monitoring period. Some micro-filtration plants will require crude sampling influent due to the nature of the treatment process.
- No sampling for Total Coliforms. The reduction performance would be surrogated by Faecal Coliform performance.
- No routine sampling for Enterovirus, Salmonella and F+ coliphage. A trigger mechanism approach is adopted to initiate Enterovirus, Salmonella and F+ coliphage sampling. The trigger would be linked to those used for the Bathing Water monitoring programme, i.e. if the Agency is required to undertake monitoring of enterovirus and salmonella in the Bathing Waters impacted by the discharge, monitoring of the discharge would also be triggered, at the frequency specified in Table 1.
- Where Salmonella sampling is required only post-disinfection samples would be collected.
- The frequency of sampling would be determined by the risk assessment (High, Medium or Low), according to the Table 1.

REDRISK: Reduction of the virus risk in shellfish harvesting areas.

Fergal Guilfoyle, Sinead Keaveney, John Flannery and Bill Doré
Marine Institute, Rinville, Oranmore.

Introduction:
Filter feeding bivalve shellfish can accumulate human pathogenic bacteria and viruses if grown in sewage-contaminated waters. Current consumer protection legislation relies on classification of harvesting areas based on their sanitary quality, using *E coli* as an indicator of sewage contamination. Advances in viral monitoring have shown that *E coli* can underestimate the extent of the contamination.

The most common cause of gastroenteritis associated with shellfish is norovirus, commonly known as winter vomiting virus. The REDRISK project was undertaken to investigate the main environmental factors that cause viral contamination in shellfish. The REDRISK project is part of a EU research pillar with parallel research being undertaken in the UK, France and Spain. A recently developed technique to quantify norovirus in shellfish, real-time PCR, has been used in the REDRISK project.

Clew Bay, in Co. Mayo was chosen as the study area in Ireland. The bay is generally considered to have good water quality but with certain areas subject to intermittent sewage contamination. The cooperation of local producers and organisations such as the Clew Bay Marine Forum and the Native Oyster Co-op greatly helped the project. The project was divided into a two-phased approach. Phase one involved the identification of contamination sources impacting the bay through a sanitary survey and selection of appropriate sites for further study. Results of the first phase of this study were presented previously at this forum (Keaveney, et al 2006) and the characteristics of the sites selected for study and locations within the bay are shown in table 1 and figure 1 respectively. The second phase of the project focused on monitoring environmental conditions and microbiological levels in shellfish to identify environmental conditions leading to viral contamination. This paper reports the finding of this monitoring.

Material and methods
Samples were collected from the sites on 40 occasions between August 2005 and July 2006. On each occasion 24 Pacific oysters (*Crassostrea gigas*) were collected from each site. Samples were then sent to the laboratory within 30 hours under chilled condition (<15°C) for *E coli*, FRNA bacteriophage and Norovirus analysis. Concurrent measurements of riverflow, rainfall, outflow volumes from the wastewater treatment plant, as well as salinity on site, were also recorded. On receipt in the laboratory oysters were cleaned and scrubbed under running potable water. A minimum of 10 oysters were shucked and homogenised for *E. coli* and FRNA bacteriophage analysis. Homogenates were analysed for *E. coli* using a standard ISO procedure (ISO/TS 16649-3). The same homogenate was centrifuged at 2000 x g and supernatant analysed for FRNA bacteriophage using a standard ISO method (ISO method 10705 – 1). Hepatopancreas was dissected from a further 6 oysters and analysed for norovirus using an established real-time PCR assay (Jothikumar, et al 2005).

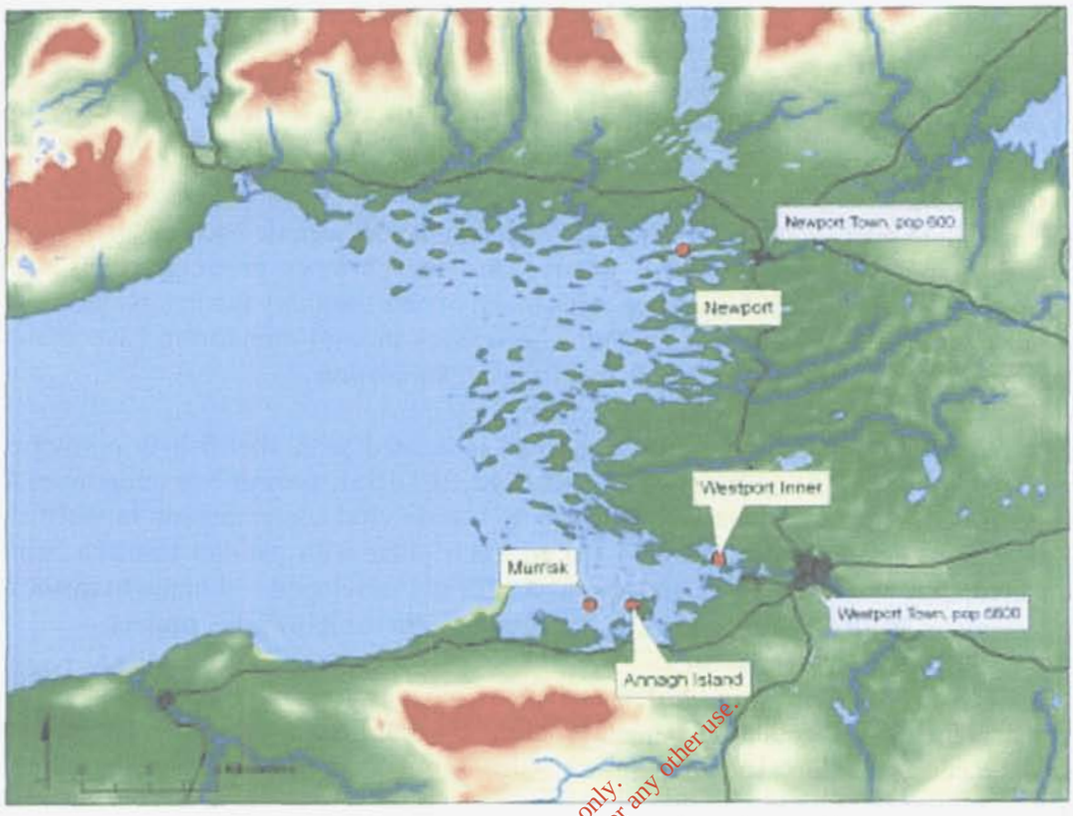


Figure 1: *Indicating the 4 experimental sample sites chosen to monitor microbiological contamination. Also indicated are the 2 main towns in the bay and the main rivers.*

Site	1	2	3	4
Classification	Category B	On cat. A/B boundary	Category A	Category B
Previous *E. coli* results:	None available	24/26 Cat A results	178/193 Cat A results	7/13 Cat A results
Distance to nearest WWTP* outfall	300m	3500m	4500m	1500m
Local population	6600	Minimal	Low	600
Freshwater input	River A av. flow 0.96 m^3/s)	River B (av. flow 1.5 m^3/s)	Very little freshwater input	River C (av. flow 5.2 m^3/s)
Animal population	1300 sheep and 1200	Some local animals	Some local sheep farming	3200 sheep and 1900 cattle
Potential risk of virus	**High**	**Medium**	**Low**	**High**

*WWTP-Waste Water Treatment Plant

Table 1: *Key characteristics for each sampling informing potential risk of viral contamination.*

Results:

The microbiological results are presented for each of the individual sites in figures 2 to 7. A high frequency of norovirus positive results were observed at the Westport site (fig. 3). Although norovirus contamination was present for most of the year (fig. 3.) levels showed a clear seasonal trend with peak PCR unit levels observed during the winter period and in particular January and February of 2006. Despite high norovirus levels at the site, *E. coli* levels were consistent with a category B classification throughout the year.

At Annagh Island both frequency of norovirus contamination and levels were significantly lower than at Westport. Norovirus was absent for much of the time (fig 5). Norovirus occurrence in oysters at the site appeared to be linked to periods of peak WWTP influent flow causing overflows of untreated sewage. The initial occurrence of norovirus at the site coincided with a storm event in October of 2005 resulting in sewage overflowing at the WWTP site. A sewage overflow event in January 2006 also appeared to coincide with a prolonged spell of norovirus contamination at the site (fig 5). This contamination appeared to last through until the middle of February. During this period despite no further sewage overflows, levels of norovirus GII appeared to increase in oysters at the site. This may be a genuine increase in virus contamination at the site at this time caused by further unidentified contamination. Alternatively it may be a feature of the low virus levels observed during the period. Apparent differences in norovirus levels in the shellfish sampled at this time may in fact be an artefact of the accuracy of the relative quantitative aspects of the assay at this level.

Norovirus contamination at the Murrisk site was observed only rarely throughout the study period (fig. 7). When norovirus contamination was observed this was at very low levels which equate to the limit of detection of the assay. In the site norovirus contamination again appeared to coincide with sewage overflow events related to increased influent levels at the WWTP in October 2005 and January 2006.

Untreated sewage also overflowed from the WWTP on two further occasions during the study period, once in August 2005 and again in May 2006. No norovirus contamination in the Annagh island and Murrisk sites were observed during these two events. This would coincide with the fact that norovirus associated illness in the population at this time would be lower at this time of year given the usual seasonal course of infection in community. Therefore levels of norovirus in sewage effluent at this period would be considerably reduced compared with levels during the winter period.

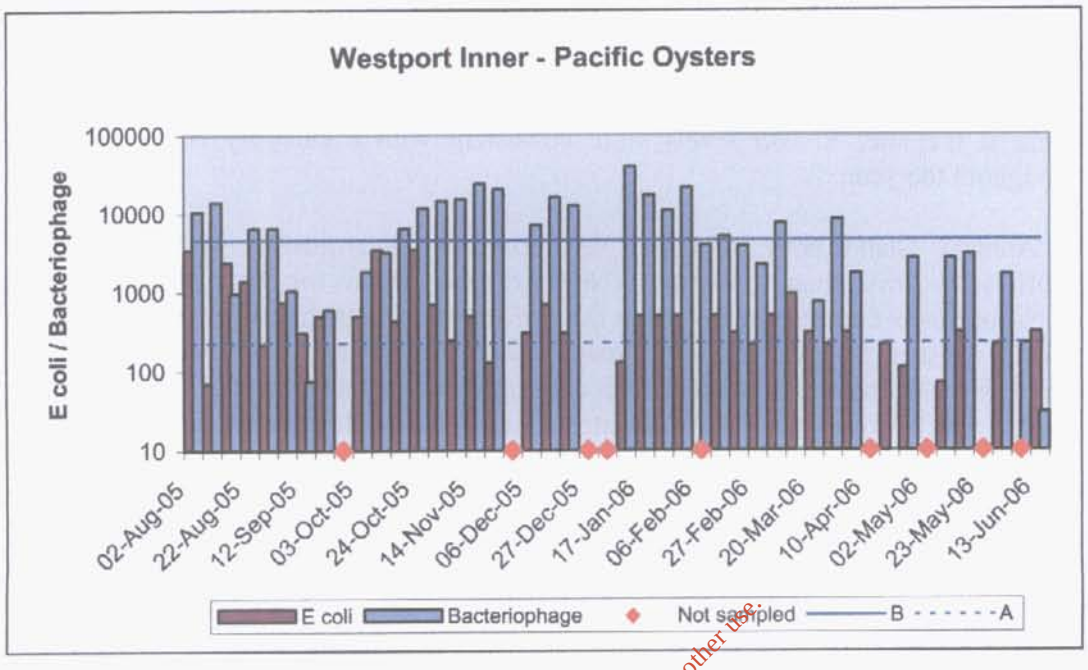


Fig 2 E. coli (MPN $100g^{-1}$) and bacteriophage (pfu $100g^{-1}$) levels in pacific oysters from Westport Inner. The category A and B classification limits are indicated. The weeks not sampled are indicated.

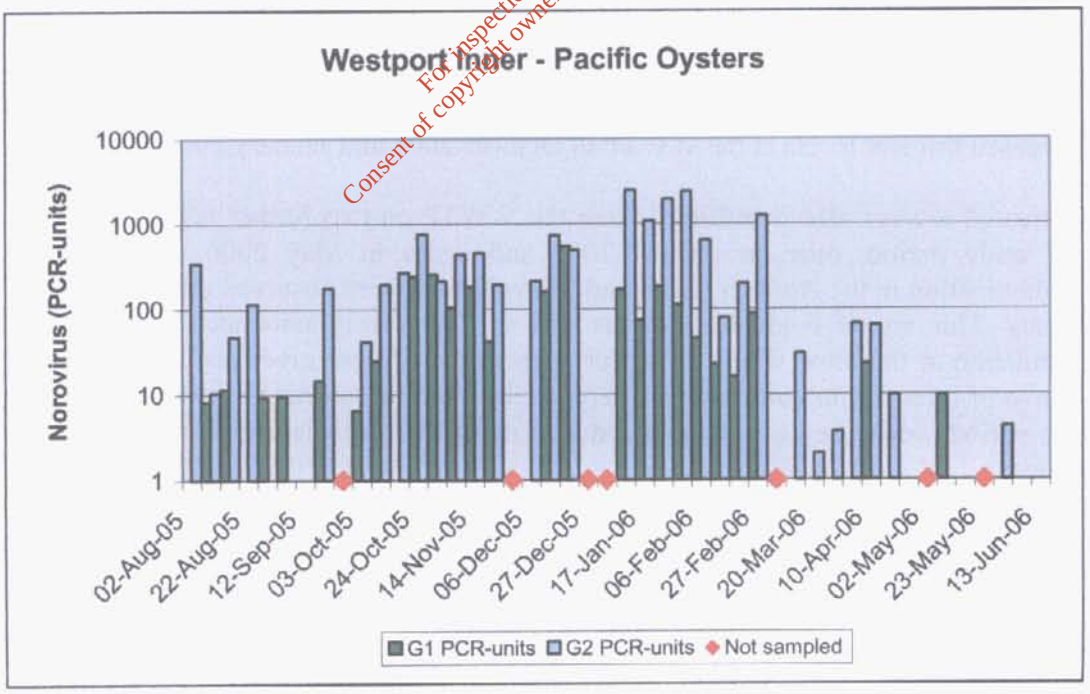


Fig 3 Norovirus GI and GII levels (PCR units) in Pacific oysters at Westport Inner. The weeks not sampled are indicated.

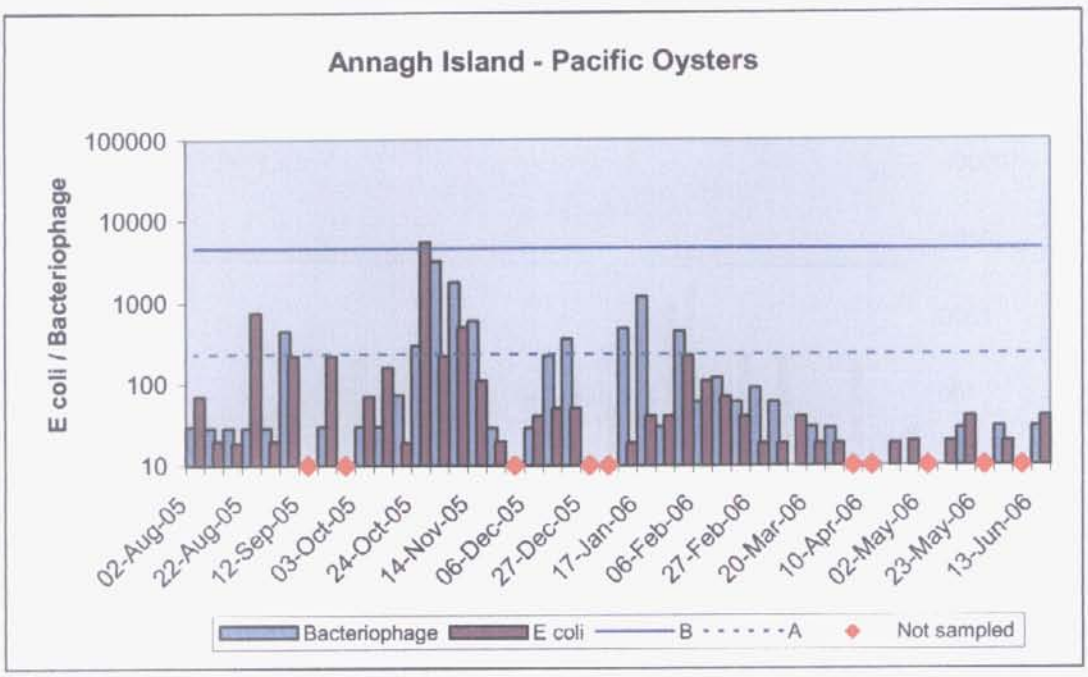


Fig 4 E. coli (MPN 100g^{-1}) and bacteriophage (pfu 100g^{-1}) levels in pacific oysters from Annagh Island. The category A and B classification limits are indicated. The weeks not sampled are indicated.

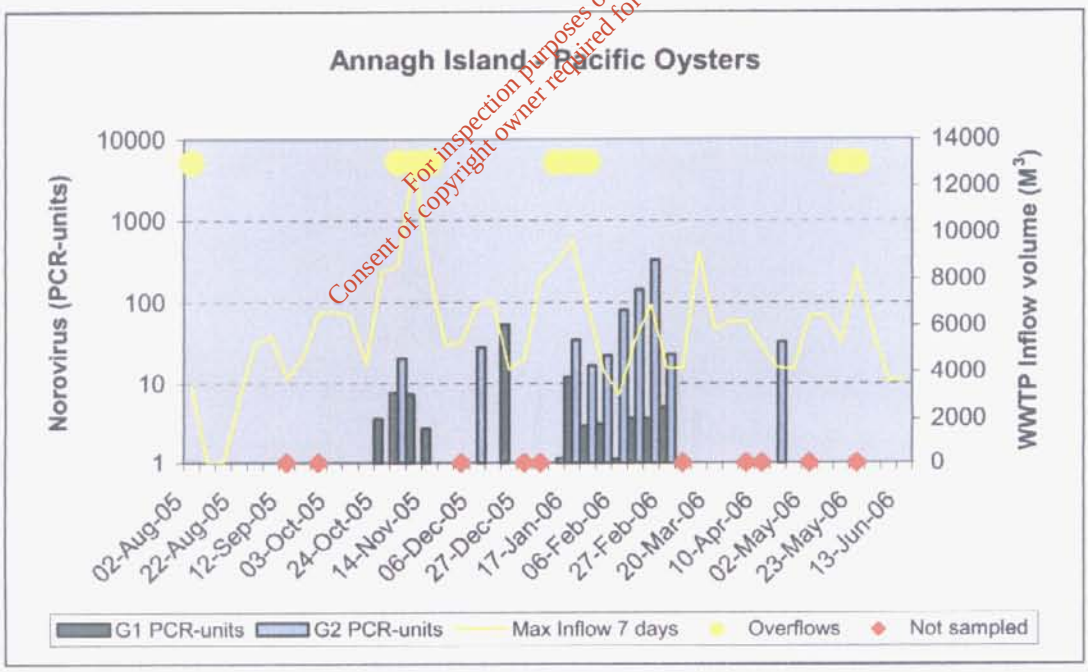


Fig 5 Norovirus GI and GII levels (PCR units) in Pacific oysters from Annagh Island. The weeks not sampled are indicated. The inflow volume to the WWTP and the periods of overflow are indicated.

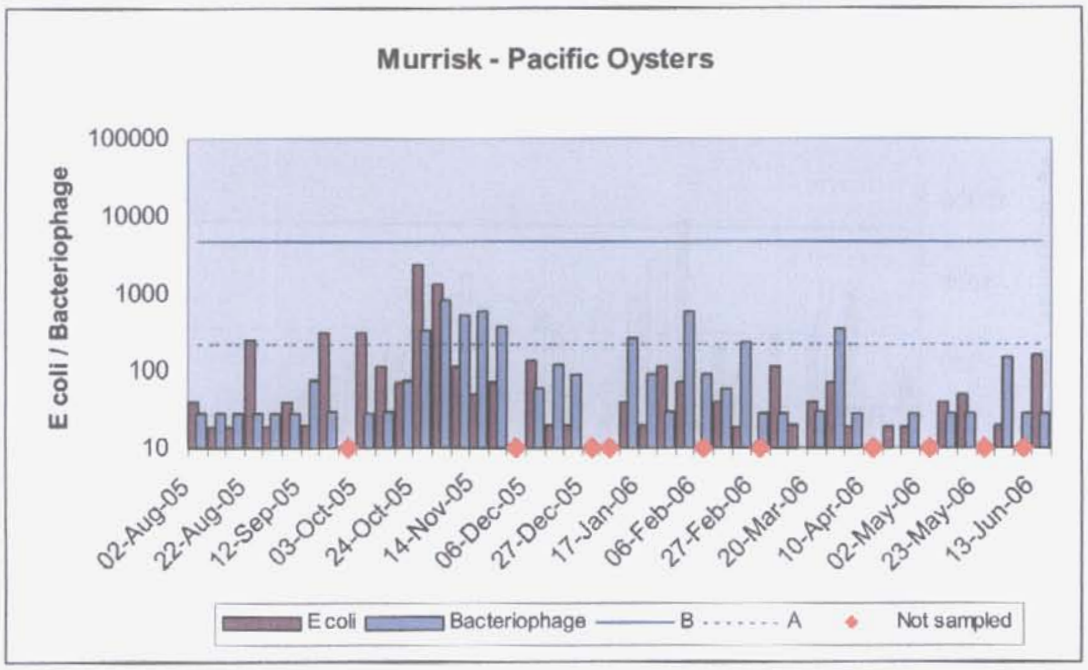


Fig 6 E. coli (MPN 100g^{-1}) and bacteriophage (pfu 100g^{-1}) levels in pacific oysters from Murrisk. The category A and B classification limits are indicated. The weeks not sampled are indicated.

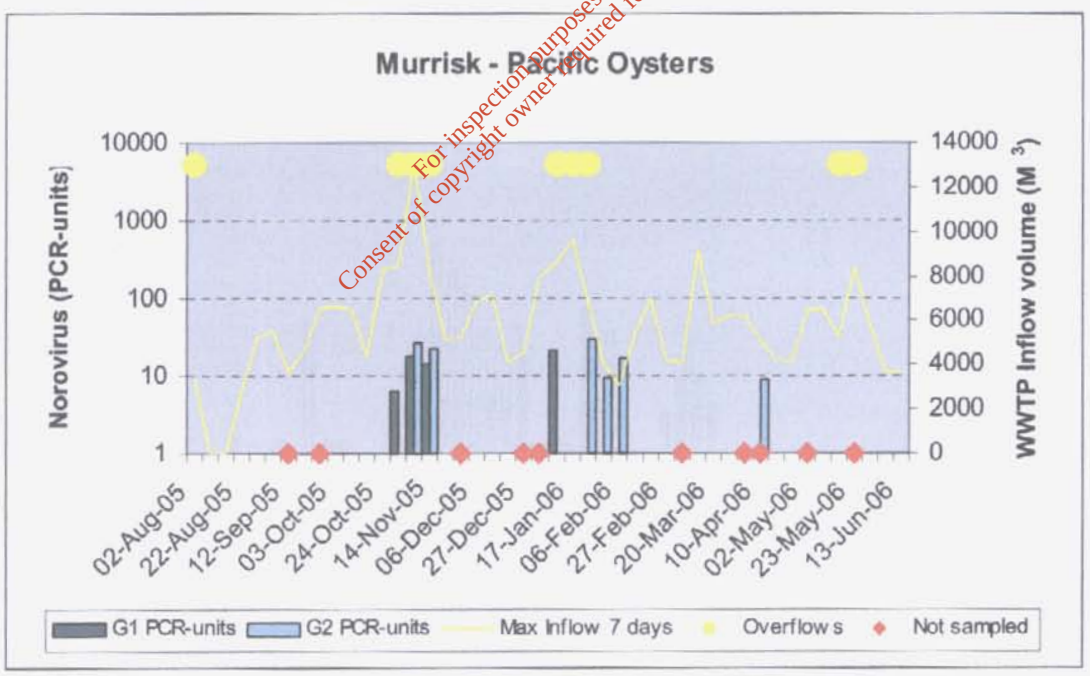


Fig 7 Norovirus for GI and GII levels (PCR units) in Pacific oysters from Murrisk. The weeks not sampled are indicated. The inflow volume to the WWTP and the periods of overflow are indicated.

Discussion:

Although, long-term, the most effective way forward to control the health risks associated with shellfish consumption is reduction of levels of sewage initially impacting shellfisheries at source (Pommepuy et al, 2004), there is an immediate need to implement active risk management procedures. In moving towards developing active risk management procedures this study demonstrates that the identification of factors leading to norovirus contamination in shellfish is possible using new real-time PCR methods. This information can be used to determine when intervention measures should be introduced to limit the exposure of contaminated shellfish to consumers. However, as demonstrated at the Westport site in this study, the almost continuous incidence of norovirus contamination at some sites (despite compliance with the existing *E. coli* standard) preclude the suitable introduction of intervention controls. Therefore a pre-requisite for the use of active risk management procedures is that shellfish harvesting areas should be relatively free from sewage pollution and subject to only intermittent norovirus contamination. Therefore a first step in developing site-specific risk management procedures is to extensively characterise the shellfishery in question. In this study the sanitary survey successfully identified sites at less risk of norovirus contamination. Sanitary surveys in other area could also be used to determine areas likely to be impacted by intermittent contamination.

Where intermittent norovirus contamination was observed this was closely linked to discharge of untreated sewage as a result of storm events. Procedures for rapid identification of these events and communication to relevant shellfish producers and risk managers is a key step in identifying high risk periods requiring intervention to manage the risk. Developing these links represents a major challenge requiring resource and commitment from all parties. The adoption of appropriate management options in each area will depend on local circumstances and the level of viral contamination.

The introduction of real-time PCR procedures allow the effectiveness of the control measures in preventing significant norovirus levels reaching consumers to be monitored as well as how long the extra procedures should be in place. However, further work is required to relate the risk of viral illness to virus levels found in shellfish to determine whether complete removal of virus is required to provide a safe product or whether there is an acceptable virus level which can be considered to present an acceptable level of risk.

Conclusions:

1. The sanitary survey accurately predicted the relative risk of norovirus contamination in oysters at each site within the study area.
2. The three major factors influencing norovirus contamination were proximity to sewage input, season, with winter representing a higher risk, and the influence of untreated sewage inputs as the result of overflows from the WWTP.
3. The introduction of active risk management procedures is only appropriate in areas subjected to intermittent contamination. Sanitary surveys can provide an initial assessment of the likely risk of norovirus contamination and determine

the suitability of a shellfish production area for the application of active risk management procedures.

4. One site was shown to be almost continuously contaminated with norovirus through the study period and was considered unsuitable for shellfish harvesting. This was despite complying with European hygiene regulations for shellfish harvesting as judged by *E. coli* data.
5. Intermittent norovirus contamination in two sites appeared to be associated with untreated sewage from overflows. These events could be used to trigger management action at those sites. Close links between WWTP managers, shellfish producers and risk managers should be developed.
6. The highest incidence and levels of norovirus contamination in shellfish occurred during the winter months. Closer links between health professionals and shellfish risk managers should be developed to more accurately determine high-risk periods from the surveillance of outbreak data.
7. Further studies are urgently required to establish the link between norovirus levels observed in shellfish and health risk in consumers. Such studies will indicate the level of management and treatment required to provide an acceptable risk in shellfish.

References

ISO 10705-1;1995: Water quality – Detection and enumeration of bacteriophages. Part 1:Enumeration of F-specific RNA bacteriophages.

ISO/TS 16649-3:2005: Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of beta-glucuronidase-positive Escherichia coli - Part 3: Most probable number technique using 5-bromo-4-chloro-3-indolyl-beta-D-glucuronide.

Jothikumar, N., Lowther, J.A., Henshilwood, K., Lees, D.N., Hill, V.R. and Vinje, J. (2005): Rapid and sensitive detection of noroviruses by using TaqMan-based one-step reverse transcription-PCR assays and application to naturally contaminated shellfish sample. Applied and Environmental Microbiology. **71** (4) 1870-1875

Pommepuy M, Dumas F, Caprais M P, Camus P, Le Mennec C, Parnaudeau S, Haugarreau L, Sarrette B, Vilagenes P, Pothier P, Kohli E, Le Guyader F (2004), Sewage impact on shellfish microbial contamination ,*Wat Sci Tech,* **50**, 117-124.

Keaveney, S., Guilfoyle, F., Flannery and Dore, B. (2006): Detection of human viruses in shellfish and update on REDRISK research project, Clew Bay. Co. Mayo.

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