



# Atlantic Shellfish Ltd.

Rossmore, Carrigtwohill, Co. Cork, Ireland

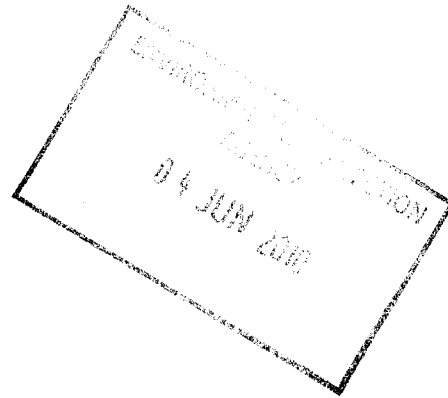
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31<sup>st</sup> May 2010



Dear Sirs,

**re Waste Water Discharge Licence Application for the Agglomeration of Spital, Cloyne in Co. Cork**  
**Ref. : D0298-01**

With reference to your acceptance of the application from Cork County Council of 28<sup>th</sup> April 2010 in response to the Appropriate Assessment, which they sent to you on 15<sup>th</sup> April 2010, may I remind you that both this effluent and that of the septic tank at Saleen, discharge via the Cloyne "River" into Saleen Creek, at the mouth of which are 2,500 trestles currently containing market oysters and through which this effluent will pass.

The Appropriate Assessment contains, as Appendix 5, the Dixon-Brosnan Report on "Assessment of wastewater discharge at Saleen", written in April 2003, which covers both the Saleen and Cloyne discharges.

As the discharge is so close to oysters, I am surprised that Cork County Council did not include the special Addendum that they commissioned from Dixon-Brosnan on, "*the impact, if any, the proposed development may have on oysters located on trestles at the mouth of Saleen Creek*" and I enclose a copy of this Report of October 2004.

In para. 4.2 you will see that the consultants refer to the ruling of the European Court of Justice that all shellfish producing areas in Ireland should now be designated as Shellfish Waters under the Shellfish Waters Directive (with the benefit of a Pollution Reduction Plan to reach the required water standard within 6 years), but that, "*it was considered unlikely that this section of Cork Harbour will be so designated in the foreseeable future.*" The purpose of this letter is to make sure that you are aware that there are now, in fact, three designated shellfish production areas in the Lower Harbour, lying between the mouth of Saleen Creek and its drainage to the East Channel of the Harbour.

The original County Council application for a WWDL of 24<sup>th</sup> February 2009 refers to their plan only last year to pump the effluent from Cloyne to a sea outfall at Ballycotton (see pp. 10 & 11). Now that the Lower Harbour has its three designations as areas for shellfish production, it is likely that the whole of the eastern harbour, to the east of a line from approximately the eastern side of the ESB Power Station at Long Rock to the middle of Cuskinny Bay on Great Island, will become a shellfish production area once again. 50 tons of marketable oysters were kept on the trestles at the mouth of Saleen Creek this winter, with the knowledge and approval of the Sea Fisheries Protection Board and Marine Institute and this company applied for an Aquaculture Licence in 2006 to also grow mussels on the area covered by the Oyster Fishery (Cork Harbour) Order, 1963, which it has held for the last 34 years.

In the light of these developments and the new requirement to improve water quality to Grade "A" level, maybe Cork County Council could be persuaded to re-visit their plan for a Ballycotton sea outfall, if this has, in fact, been given up.

In Scotland, where we manage a large native oyster fishery, the Food Standards Agency (Scotland) stipulated that the treated effluent could only be released close to oysters if the Water Company could ensure that their treatment would be "100% effective all the time." SEPA supported this line, as too did the Scottish Government, and the treated sewage effluent is to be pumped 8 miles overland and away from the loch, to an open sea outfall. Unfortunately it is this standard of water quality that is required of a shellfish producing water, as the norovirus which causes the gastroenteritis associated with eating raw oysters, will survive in oyster tissue for 6-8 weeks and is very difficult to deplete with the standard UV installations. Thus a single incident every 6 weeks is enough to keep a fishery permanently contaminated and a danger to health. Siting of the outfall is of paramount importance to eliminating the almost certain risk of blips in treatment standards due to storm overflows in heavy rain, breakdowns of plant and equipment, human error etc. I am in favour of the polishing of the treated effluent from Cloyne WWTP by discharging it to the river via a reed-bed, but would remind you that norovirus appears to be very resistant, especially in fresh water and less than 10 viral units are thought to be enough to cause human illness. Discharge to the open sea in Ballycotton Bay might prevent another costly Midleton debacle and might prove the less onerous option in the long run and definitely very much safer from a human health perspective.

The Final Characterisation Reports and their associated Pollution Reduction Plans can be found on the DEHLG website for the 3 Rostellan areas:

<http://www.environ.ie/en/Environment/Water/WaterQuality/ShellfishWaterDirective/ShellfishWaters>

Yours sincerely,



D. L. Hugh-Jones

Enclosed: Copy of the Dixon-Brosnan Addendum to Saleen Report 02070038 on the effect of the proposed discharge of treated sewage effluent on oysters located at the mouth of Saleen Creek (1<sup>st</sup> October 2004).

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<b>Dixon . Brosnan</b> environmental consultants	
project title	Addendum to Saleen Report 02070038.
client	Cork County Council
client ref	-
our ref.	03 088
revision	0 - issue to client
date	1st October 2004
approved by	Carl Dixon
certified only where signed	
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## 1. INTRODUCTION

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- 1.1 Dixon.Brosnan were previously commissioned by Cork County Council to carry out an environmental assessment of a proposed upgrade to the sewage treatment system serving Saleen, Co. Cork. Saleen is a small village situated 5km south of Midleton. The village is currently served by a septic tank system located on a site 300m southwest of the village. Cork County Council have identified that the existing system is no longer satisfactory and proposes to install an improved wastewater treatment plant (WWTP) near the existing site. The assessment included the examination of the most suitable means of disposal of treated wastewater and the treatment standard required. The impacts of the proposed development were examined with respect to the existing environment. The results of this assessment and recommendations on treatment were detailed in Dixon.Brosnan Report No. 02070038.
- 1.2 Following submission of this report to Cork County Council Dixon.Brosnan were requested by Cork County Council examine in more detail at the impact, if any, the proposed development may have on oysters located on trestles at the mouth of Saleen Creek. The location of the trestles is shown in Figure 1. For the purposes of this report the larger watercourse, which runs from Cloyne to the Cork Harbour south of Saleen, is referred to as the "Cloyne River". The smaller tributary which flows south from Saleen village and into which the current septic tank discharges is referred to as "Saleen Stream". The tidal section of the Cloyne River is referred to as "Saleen Creek".

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Figure 1 showing the location of trestles and flow monitoring points.

### 2.1 CONCLUSIONS OF REPORT 02070038

- 2.1 As detailed in Report 02070038 the proposed discharge was examined in respect of possible impacts on ecology, water quality, underlying geology, fisheries, mariculture and noise. Any possible impacts were also examined in respect of the relevant legislation. A summary of the main findings and recommendations of the report are detailed below:
- 2.2 The Cloyne River catchment is relatively small in area and there is no long-term water quality data available. No direct measures of flows are available for Cloyne River. Flow rates were calculated on the basis of known flow data for an adjacent catchment, which matches the Cloyne catchment in many respects. Samples taken at the study site during the preparation of this report indicate that water quality

in the Cloyne River was slightly unsatisfactory at the time of sampling, with elevated nutrient levels detected.

- 2.3 Following an assessment of disposal options, it is recommended that the proposed upgraded discharge be directed to the Cloyne River. The available dilution capacity is sufficient to treat up to 1500p.e, although dilution is relatively restricted at this loading.
- 2.4 Minimum treatment standards recommended were as follows: BOD - 15mg/l, SS - 30mg/l, total N - 20mg/l and total P - 1mg/l. The quality standards recommended are relatively restrictive, with some degree of both nitrogen and phosphorous removal required. The requirement for a high quality effluent is a product of limited available dilution, moderate background water quality and the complications associated with discharging a nitrogenous waste stream to a saline environment of some ecological importance.
- 2.5 Disinfection was not recommended on the basis of (i) the level of treatment which will be applied to the discharge, (ii) the dilution available within the Cloyne River-Saleen Creek system, (iii) the decay of micro-organisms in the natural environment, (iv) the distance between the proposed WWTP outfall and the creek mouth, and (v) the significant dilution available in the northeast harbour.
- 2.6 It was recommended that a monitoring programme be undertaken following the commissioning of the WWTP selected. An ongoing examination of key microbiological parameters, including total and faecal coliforms, faecal streptococci and sulphite-reducing clostridia, may be used to determine the overall treatment efficiency of the system chosen. It is recommended that the design of the WWTP be such that the post-installation of disinfection equipment is facilitated if deemed necessary following an assessment of the results obtained from the sampling programme.

### 3. LICENSING

- 3.1 An aquaculture licence is generally required for aquaculture under the Fisheries (Amendment) Act, 1997. Following consultation with the Department of Marine it was determined that no licences have been granted for aquaculture for the area in which the trestles are currently located. Where structures such as trestles are used a licence is also required under the Foreshore Act, 1933. No licence has been granted under this act.
- 3.2 In this instance however an order was granted under the Harbour Act, 1963 allowing the cultivation of shellfish in Cork Harbour. As this order predates the Fisheries Amendment Act of 1997 a licence to grow oysters is not therefore required for growing oysters in the area at the mouth of Saleen Creek.

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## 4. LEGISLATION

- 4.1 Council Directive 79/923/EEC of 30 October 1979 on the quality required by shellfish waters (Shellfish Directive), and the associated Quality of Shellfish Waters Regulations, 1994 (S.I. No. 200 of 1994) specify designated coastal and brackish waters needing protection or improvement in order to support shellfish. Specified limit values apply to these areas. There are no designated shellfish areas on this stretch of the Irish coastline, and thus the Directive and Regulations do not apply.
- 4.2 The EU has recently upheld a complaint that the Irish Government failed in its statutory duty to implement the 1979 Shellfish Directive. The Directive requires the designation of shellfish production areas and the drawing up and implementation of water quality management to enhance water quality to class 'A' equivalent standards. The complaint was lodged in response to the State's downgrading of the majority of bays used for aquaculture purposes from class 'A' waters to class 'B'. In light of the upholding of this complaint Ireland will be required to show greater compliance with the 1979 Directive. At present only 14 bays are designated under the directive. It is expected that following the upholding of this complaint that additional sites will be designated in the future; however it is considered unlikely that this section of Cork Harbour will be so designated in the foreseeable future.
- 4.3 In line with the provisions of Council Directive 91/492/EEC (as amended by Council Directive 97/61/EC) which lays down the health conditions for the production and the placing on the market of live bivalve molluscs, a 'B' classification currently applies to the area of Rostellan close to the mouth of Saleen Creek. This designation requires that all mussels and oysters harvested in Cork Harbour may be placed on the market for human consumption only after treatment in a purification centre or after relaying, which ensures that requirements specified in Directive 91/492/EEC are met. Directive 91/492/EEC specifies, *inter alia*, that shellfish tissue is required to contain limited numbers of faecal coliforms. It is noted that live bivalve molluscs must not exceed, in 90 per cent of samples, the limits of a five-tube, three-dilution MPN-test of 6,000 faecal coliforms per 100g of flesh, or 4,600 *E.Coli* per 100g of flesh.

## OYSTERS IN CORK HARBOUR

Concerns with the consumption of oysters come into two categories namely:

- i - problems associated with the presence of toxins produced by some species of marine phytoplankton. (i.e Diarrhetic Shellfish Poisoning (DSP), Azaspiracid poisoning (AZP), Paralytic Shellfish Poisoning (PSP) and Amnesic Shellfish Poisoning (ASP).
- ii - Problems associated with the microbial water quality including Norwalk or Norwalk-like viruses (winter vomiting bug).

For the purposes of this report only possible impacts due to microbial factors are considered to be of direct relevance. A high profile problem in the eastern section of Cork Harbour is the closure of oyster



producing areas due to the detection of the Norwalk virus (winter vomiting bug) in mature flat oysters (*Ostrea edulis*) from the North Channel.

53 The eastern section of Cork Harbour is currently closed and market sized oysters cannot be sold from this section of Cork Harbour. This area was closed due to the presence of Norwalk virus (winter vomiting bug), which has been detected in oysters from the North Channel area. Although bacterial levels are often used to indicate likely viral contamination; in this area of Cork Harbour specific monitoring for viruses is carried out. This has detected the virus in shellfish although results since August 2004 have been clear. Norwalk virus has not been detected in samples taken from Japanese oysters from this area. Bacterial monitoring showed that the levels of bacteria detected in oysters from Rostellan were generally indicative of an 'A' classification; however as some of the results were borderline a classification of B was considered appropriate (Department of Marine). This classification is of little practical significance due to the aforementioned closure of this section of Cork Harbour.

#### NORWALK LIKE VIRUSES (NLVs) – WINTER VOMITING BUG

Norwalk Like viruses (NLVS) are a group of viruses, which cause gastroenteritis in humans. Although the virus can be transmitted by a variety of sources bivalve molluscs present a particularly high risk because of their ability to concentrate viruses from contaminated waters in their tissues. Oysters are often consumed raw or lightly cooked which contributes to the risk. Available data show that bivalve molluscs present a well-documented source of NLV infection (Opinion of the Scientific Committee on Veterinary measures relating to public health on Norwalk Virus, 2002). Viruses can contaminate seafood either through contamination at source 'principally through sewage pollution' or during seafood preparation. Oysters from Cork harbour were the cause of an outbreak of winter vomiting bug in Hong Kong in 2002. This resulted in the closure of oyster farms in the eastern side of Cork Harbour and these viruses are therefore of particular concern for Cork Harbour.

Sanitary controls for the production of live bivalve molluscan shellfish are covered by Council Directive 91/492/EEC. A major feature of control measures is the use of faecal coliforms in shellfish to assess contamination. Shellfish meeting a microbial standard as well as standards for specific pathogens i.e. (*Salmonella* sp.), chemicals and algal biotoxins are considered suitable for human consumption. No viral standards are currently set by EU legislation.

Studies have shown that the higher the average number of *E. coli* at a site the more likely it is to be contaminated. The classification of harvesting areas based on *E. coli* numbers therefore provides a degree of protection against frequent episodes of viral contamination. Although monitoring of viral contamination is not specified under the relevant directives due to ongoing problems direct viral monitoring is carried out in this section of Cork Harbour.

Live shellfish from class 'B' areas must be purified and Council Directive 91/492/EEC details requirements for approval of shellfish purification centres. However there is evidence to suggest that

depuration may fail to eliminate enteric viruses from contaminated shellfish and further that compliance with *E. coli* end product standards does not provide a guarantee of virus absence. A second method relaying, which involves the transfer of harvested animals to cleaner estuaries for self-purification, can be used for class 'C' and 'B' shellfish. Studies indicate the effectiveness of this method may be related to water temperatures and the species involved.

- 6.5 Human faeces may contain millions of virus particles and viruses are therefore continually discharged into the marine environment. Viruses can last for weeks to months in the water column or in sediments. Although sewage treatment processes may be only partially effective at virus removal the reduction or prevention of sewage pollution of shellfish harvesting areas is considered the most effective method of tackling the problem. This is easier to accomplish in countries such as the Netherlands where shellfish production is concentrated in a few geographical areas. In Ireland the shellfish industry is widely dispersed and expenditure on adequate sewage treatment at some locations can seem disproportionate to the value of the shellfish industry at that location. (Opinion of the Scientific Committee on Veterinary measures relating to public health on Norwalk Virus, 2002).

## 7. SITE INSPECTION

- 7.1 An examination of the site in September 2004 indicated the presence of immature Japanese oysters (*Crassostrea gigas*) located on trestles approximately 1.5 km from the proposed treatment plant on the northern side of the bay. The location of the trestles is shown in Figure 1. The trestles are located in a compact block on a muddy substrate and approximately 50% of the trestles held oysters. No oysters of marketable size were noted at the site and no flat oysters were present. It is believed that seed oysters were sold from this site in 2003. It is not known how long these trestles have been in place.
- 7.2 A second block of trestles, which contains mature Japanese oysters is located at Rostellan approximately 2.3km from the discharge point on the southern side of the bay. Although most of the trestles are empty there are approximately 100-200 bags of mature oysters. Due to closure of this area of Cork Harbour these oysters cannot be sold at the present time.
- 7.3 Prior to closure of the eastern section of Cork Harbour the main activity was the growth and sale of native oysters; however only Japanese oysters have been grown in the area adjacent to Saleen. Native oysters are grown in direct contact with the sediment. Although seed Japanese oysters are grown on the seabed in the North Channel the oysters at Saleen/Rostellan are grown in bags on trestles and are not therefore in direct contact with the sediment. Japanese oysters grown on trestles may not be as susceptible to viral infection for this reason.

## 8. EXISTING TREATMENT

- 8.1 The septic tank system currently serving Saleen was originally designed to treat wastewater arising from twelve houses in the village. Since its installation, a number of additional connections have been made and the system is now entirely overloaded. At present there are approximately 48 houses in the village and its immediate environs and a further 68 new houses have been built close to the village which are accessed from the road to Midleton. The following premises are also present; one bar, a national school and one shop (McDonalds Grain & Agricultural supplies). This count excludes a small number of houses, which are located outside the boundary of the village. Based on a figure of 4.5 persons per house the total population equivalent is estimated at 550 p.e. although it is noted that some of these premises may not discharge to the existing tank.
- 8.2 Further site examinations indicate that the level of treatment provided by the existing septic tank is minimal. This is indicated by fungal growth in the receiving stream, strong odours and the results of water monitoring. An examination of the septic tanks shows that high levels of sludge have built up and that retention time within the system is probably minimal. The presence of large material in the stream such as sanitary products also indicates that waste is not being effectively broken down within the existing system. A sample from the liquid in the septic tank was taken in January 2004 and analysed for microbial parameters. The results are shown in Table 1.

Table 1: Analysis of liquid from the septic tank at Saleen January 2004

Parameter	Count MPN/100ml
Total coliforms count	830,000
Faecal coliforms count	280,000

- 8.3 Based on the condition of the stream including the presence of large detritus it is considered likely that bacterial numbers in this sample are probably lower than the numbers which will occur during times of peak flow. Due to its limited size and the build up of silt within the existing septic tank it is probable that during peak flows retention time within the septic tank is minimal. It is also probable that some degree of infiltration of storm water occurs. A high level of solids reaching the stream will significantly increase the level of Norwalk virus, if present, reaching the receiving water.
- 8.4 The EPA document *Wastewater Treatment Manuals: Treatment Systems for Small Communities, Business, Leisure Centres and Hotels* (1999) notes that recent research suggests that per capita wastewater flow averages 180l/day. Using this flow rate, the average daily volume (dry weather flow – DWF) of wastewater arising from design populations of 1000, 1200 and 1500p.e. will be 180, 216 and 270m<sup>3</sup>/day respectively.
- 8.5 As there are no industrial discharges to the existing sewage network, the wastewater arising in Saleen is domestic in nature. The characteristics of such wastewater streams have been documented by the EPA (1999) and are summarised in Table 2.

Table 2. Domestic inflow wastewater characteristics from EPA study.

PARAMETER	MEAN
Total coliforms	$1 \times 10^8$ CFU per 100ml
Faecal coliforms	$4 \times 10^7$ CFU per 100ml

Source: EPA

- 8.6 At present wastewater from Saleen is treated via a septic tank. The main function of a septic tank is to act as a primary settlement tank removing some of the BOD and the majority of the suspended solids. The EPA publication '*Primary, secondary and tertiary treatment*' (EPA 1997) estimates that typically primary settlement tanks reduce the bacterial count by 25-75%. One of the most important criteria is the retention time available in the tank. For the existing septic tank at Saleen the retention time at times of peak flow is likely to be limited based on (a) the small size of the tank in relation to the flow going through it and (b) the build up of sludge. Therefore notwithstanding the relatively low values for bacteria recorded from a survey in January 2004 a conservative estimate for the average reduction in bacteria would be 30%.

## 9. PROPOSED TREATMENT

- 9.1 It is proposed to increase the design capacity of the upgraded system, initially to 1000p.e. and possibly ultimately to 1200-1500p.e., to allow for the future development of the Saleen area.
- 9.2 All treatment processes applied to wastewater will provide some degree of coliform reduction, usually via the filtration of suspended solids in the wastewater stream. Gray (1999) reports that conventional treatment will remove up to 90% of bacterial pathogens. The exact degree of coliforms will depend on the treatment system put in place; however for the purposes of this report a conservative estimate of 80% coliform reduction is assumed in the absence of a specific disinfection system.

## 10. A COMPARISON OF TREATMENT EFFICIENCIES

10.1 Table 3 gives estimates of the likely changes in bacterial numbers at different population equivalents.

Table 3 – A comparison of treatment efficiencies for total and faecal coliforms

	<i>Assuming primary treatment via existing septic tank</i> Population equivalent. 550p.e. Pathogen removal 30% (estimated)	<i>New treatment plant.</i> Population equivalent 1,000 Pathogen removal 80% (estimated)	<i>New treatment plant.</i> Population equivalent 1,200 Pathogen removal 80% (estimated)	<i>New treatment plant.</i> Population equivalent 1,500 Pathogen removal 80% (estimated)
<i>Total coliforms</i> 7x10 <sup>7</sup> CFU per 100ml		Pathogen numbers reaching the environment decreased by 48%	Pathogen numbers reaching the environment decreased by 38%	Pathogen numbers reaching the environment decreased by 22%
<i>Faecal coliforms</i> 2.8 x10 <sup>7</sup> CFU per 100ml				

10.2 It should be noted that the figures detailed above are based on estimates only. during time of peak flow it is likely that pathogen removal will be minimal due to very limited retention time. At these times therefore a high percentage of solids will be present within the waste stream. Solids are likely to support a higher microbial load. It is also possible that storm water is reaching the septic tank. Storm water discharges from combined sewer systems may be heavily contaminated with untreated effluent and rainfall-associated outbreaks of shellfish vectored disease have been reported (Opinion of the Scientific Committee on Veterinary measures relating to public health on Norwalk Virus, 2002).

10.3 A new treatment plant should reduce the bacterial numbers in the final effluent. It is also noted that the use of a flow balancing system should reduce fluctuations in the system and should significantly reduce the amount of solids being discharged.

## 11. CLOYNE TREATMENT PLANT

11.1 A modern WWTP and constructed wetland at Cloyne currently treats a loading of 800p.e. The treatment plant discharges into the Cloyne River adjacent to the treatment plant approximately 3km upstream of the proposed discharge point at Saleen. High removal efficiencies of pathogens have been reported from wetland systems however no data on pathogen numbers in the discharge is currently available. It is also noted that the discharge point from Cloyne WWTP is approximately 4.5 km from the trestles at the mouth of Saleen creek. Dilution and the effects of natural biotic and abiotic factors in surface waters will reduce the density of pathogens and in the absence of specific studies it is not possible to predict the percentage of discharged microbes, if any, which will reach the trestles.

## 12. ADDITIONAL FLOW MONITORING

- 12.1 There is no staff gauge on the Cloyne River or Saleen stream and no long-term flow data is therefore available. To estimate flows in the Cloyne River it was therefore necessary to compare the Cloyne River with a watercourse in the same geographical region for which flow data was available. The EPA Hydrometric Office have maintained a staff gauge previously on the river at Titeskin and the characteristics of this catchment and watercourse are similar to those pertaining to the Cloyne River. Flow data were obtained for the period December 1979 to September 1992. The catchment area of the Carrigacrump valley upstream of the staff gauge is 5.8km<sup>2</sup> and the unit area dry weather flow is calculated at 2.31l/s/km<sup>2</sup>. Applying this flow rate to the Cloyne River it was estimated that the total flow at the discharge point which includes the discharge from Cloyne WWTP, Saleen Stream and the Cloyne River was 2240m<sup>3</sup>/day. Further information on the calculations of flows is given in report 02070038.
- 12.2 A further assessment of flow rates was made in September 2004. Flow readings were taken at Titeskin and on the Cloyne River downstream of its confluence with the Saleen stream (See Figure 1). Flow readings were taken by measuring the cross sectional area combined with velocity readings taken across the stream. Velocity readings were taken using standard methods using an OTT Sena flow monitor.
- 12.3 The objective of the exercise was to determine if the unit flow measurements were similar for both streams. Rainfall in August 2004 was quite high and the results obtained are not therefore indicative of low flow conditions.
- 12.4 The flow on the Cloyne River was measured at 0.109m<sup>3</sup>/s. This equates to 9418 m<sup>3</sup>/per day for a catchment area of 10.5 km<sup>2</sup>. It is estimated that 140m<sup>3</sup>/day is derived from the Cloyne WWTP (excluding stormwater). The unit flow for this survey is therefore calculated at 10.4l/s/km<sup>2</sup>. The flow at Titeskin was measured at 0.0413 m<sup>3</sup>/s. This equates to 3568 m<sup>3</sup>/day for a catchment area of approximately 5.5km<sup>2</sup>. The unit flow for this survey is therefore calculated at 7.51l/s/km<sup>2</sup>.
- 12.5 Although it is noted that the results detailed above are from one survey only they do indicate that flow rates in the Cloyne river are higher than those in the stream at Titeskin. Therefore extrapolation from the flow data for Titeskin stream to estimate the flows in the Cloyne river is justified. It is also noted that an extra margin of safety was provided by using the dry flow data rather than the 95 percentile flows when calculating flows in the Cloyne River.

### 13. CONCLUSIONS

- 13.1 As detailed in section 10 the construction of a new treatment plant should reduce bacterial contamination.
- 13.2 Due to the limited size of the existing septic tank and build up of sludge large amounts of solids are being discharged into the receiving stream. A site examination indicates this discharge is having a significantly deleterious effect on water quality in the stream. The discharge of high levels of solids will be significantly improved by the provision of a new treatment plant.
- 13.3 Due to the detection of Norwalk virus from oysters in the North Channel, the eastern section of Cork Harbour is closed and mature oysters cannot be sold at present.
- 13.4 Oyster trestles are located approximately 1.5 km from the proposed discharge point at Saleen and contain a mixture of immature (*Crassostrea gigas*). It is estimated that it will take approximately 2 years before these immature oysters are of marketable size. Previously oysters have been sold from this location as seed and this is permitted because if the oysters are on-grown for a considerable period elsewhere any viral contamination of the shellfish which may have arisen at Saleen will not longer be present when the shellfish are harvested. A second block of trestles located at Rostellan contains mature Japanese oysters, which cannot be sold.
- 13.5 The area close to Saleen is not used for growing native oysters and Japanese oysters are grown on trestles, which are not in direct contact with the sediment. This may reduce the likelihood of viral contamination.
- 13.6 Monitoring of oysters at Rostellan did not indicate the presence of the Norwalk virus. Although the Rostellan area received a "B" classification microbial were indicative of an "A" classification; however due to a small number of borderline results a "B" classification was considered appropriate. Despite the poor treatment provided by the current treatment system at Saleen, samples taken to date do not indicate that this discharge is causing serious microbial contamination of oysters.
- 13.7 Direct measurements of flow were recorded from both the Cloyne River and from a stream in a neighbouring catchment at Titeskin. Although only one reading was taken on each stream the results indicate that recorded data from Titeskin is relevant when estimating flows in the Cloyne River.
- 13.8 The number of bacteria reaching the environment is likely to decrease following commissioning of the new treatment plant despite the increase in population and results do not indicate that the current discharge is having a significant impact at this location. No native oysters are grown at this location and in addition due to the closure of this section of Cork Harbour mature Japanese oysters cannot be sold from this location. Bacterial or viral contamination if of less significance for seed oysters, which will be on-grown elsewhere.

- 13.9 At present there is no evidence to indicate that disinfection is required for the new WWTP at Saleen. However the presence of Norwalk virus in the wider area is a cause of concern and an estimate of possible contamination would be of value particularly if this section of Cork Harbour should be re-opened in the future.

#### 14. RECOMMENDATIONS

- 14.1 It is recommended that a dye study should be carried out to determine if the discharge of treated effluent from a new WWTP would increase microbial levels at the trestles shown on Figure 1. This study should take into account any possible impacts from the treatment plant at Cloyne.
- 14.2 As noted in Report 02070038 It is recommended that a monitoring programme be implemented following the commissioning of the treatment system selected. This should assess general bacterial parameters including total coliforms, faecal coliforms, faecal streptococci and sulphite-reducing clostridia. It is also recommended that monitoring at Cloyne WWTP is carried out to determine the microbial concentration of the final effluent.

#### 15. REFERENCES

- Crites, R. & Tchobanoglous, G. 1998. *Small and decentralized wastewater management systems*. McGraw-Hill.
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