SECTION G: PROGRAMMES OF IMPROVEMENTS

Advice on completing this section is provided in the accompanying Guidance Note.

G.1 Compliance with Council Directives

Provide details on a programme of improvements to ensure that emissions from the agglomeration or any premises, plant, methods, processes, operating procedures or other factors which affect such emissions will comply with, or will not result in the contravention of the;

- Dangerous Substances Directive 2006/11/EC,
- Water Framework Directive 2000/60/EC,
- Birds Directive 79/409/EEC,
- Groundwater Directives 80/68/EEC & 2006/118/EC,
- Drinking Water Directives 80/778/EEC,
- Urban Waste Water Treatment Directive 91/271/EEC,
- Habitats Directive 92/43/EEC,
- Environmental Liabilities Directive 2004/35/EC,
- Bathing Water Directive 76/160/EEC, and
- Shellfish Waters Directive (79/923/EEC).

Attachment G.1 should contain the most recent programme of improvements, including a copy of any approved funding for the project and a timeframe for the completion of the necessary works to take place.

Attachment included	**Yes**	**No**
	√	

Attachment G.1 Compliance with Council Directives

PROPOSED NETWORK

A foul sewer system is in existence, and extensions/upgrades to this are proposed in order to collect effluent from the existing dwellings which are served by individual treatment systems. Provision will be made for serving new houses currently under construction and houses where planning permissions have been granted. The foul sewer network, where possible, will provide for the capacity necessary to serve the future development areas within the existing Development Boundary.

The upgrades and repairs will also aim to reduce infiltration and repair slack gradients which can lead to excessive deposition and possibly blockage of the sewers, and subsequent public health and maintenance issues. Where possible and economical, storm water will also be removed from the combined system.

The existing wastewater collection network was discussed in Section 2 of this Report. The following work was undertaken in order to assess the performance of the existing networks and to identify required sewerage improvement works for this scheme;

Manhole Location and Sewer Inspection Survey
Hydraulic Model of the network

An assessment of the likely development areas has been made and future extensions to the sewerage network have been identified in order to serve these areas.

Proposed Foul Network

The design of sewer extensions to serve areas of future development was made using the following design criteria:

The trunk sewer network shall be designed to carry flows up to 6 times the dry weather flow. Provision shall be made at the WWTP and pump station for handling of peak flows.

All future developments shall be constructed with separate foul and surface water drainage systems.

The proposed extensions are illustrated on Figure 1 and shown on Drawing No. 20367-BD-07. The proposed works will cater for the immediate needs of the village as well as provide the capacity to cope with future development. Pipelines required to serve private lands have not been shown, as their routes will be decided by developers, but have been taken into account in the analysis of the network, so that any area of can be connected to the network, without negatively affecting the performance of the network. This has been done by examining the least favourable connection point for each parcel of land, allowing a confidence that any other connection point for a parcel of land will lead to more favourable conditions.

Ballylongford Extensions and Upgrades

Sewer Upsizing – Existing Network
The upsizing of 150 mm pipes to 225 mm pipes are proposed between manholes EF 65 (7402) to EF 61 (8503). It is also recommended that the 300 mm pipelines between manholes EF 54 (9805) and EF 53 (9001) is increased to 375 mm to cope with future development at the same time improve hydraulic deficiencies which may arise for storm events with return periods over 5 years. This is shown on Drawing No. 20367-BD-07.

Section A – Sewer Extension
227 metres of 225 mm gravity sewer laid at available gradient will have the capacity to cater for future population at the zoned areas northwest of Ballylongford village. The proposed sewer extension would connect to the existing system at manhole EF 15 (4401). This is shown on Drawing No. 20367-BD-07.

Section B – Sewer Extension
225 mm sewer laid at available gradient will have the capacity to serve the future population of Rusheen Park area. The length of the extension is 340 metres and would join the existing network at node EF 11 (4201). This is shown on Drawing No. 20367-BD-07.

Section C – Sewer Extension
New developments in Arghangran Middle area would be served by a 225 mm diameter sewer extension. The 160 metres long sewer pipeline would connect to the existing system between manholes EF 9 (4102) and EF 8 (5001). This is shown on Drawing No. 20367-BD-07.

Section D – Sewer Extension
It is not possible to transfer flows from the south zoned areas of Ballylongford to the existing network by gravity pipeline due to topographic constraints along the route. The existing 5 houses in that area would transfer flows to manhole EF 65 (7402) with the help of individual package pumping stations via a small bore pressure sewer. This has proved to be the most economical method of serving this area. This involves the use of macerating pumps and small bore pipelines.

Further to the proposed works mentioned, a new pumping station is required to divert discharges from the western half of the network to the eastern network. The diversion would eliminate tidal interferences experienced at the western sewer network. The pump is sized to serve half the projected ultimate population of 1,584. The pumps are sized to transfer flows as much as 12 l/s to for cater 6 times the dry weather flow to the eastern network. The optimum rising main diameter was determined to be 150 mm diameter to cater for future development over the life span of this report and would connect the proposed pumping station off Ballybunion Road and manhole EF 54.2.2 (9802). A storm water tank is required within the site to accommodate surface runoff from the existing buildings during heavy rainfall events and prevent oversizing of the pump station/rising main system and the overloading of the eastern network. The storm tank was sized to cater for storm events with a 5 year return period.

A pumping station will also be required on the eastern catchment to transfer flows to the WWTW. This second pumping station will ensure that the tidal influence on the network is complete eliminated. This is shown on Drawing No. 20367-BD-07.

Environmental Issues

There are several houses along the Ballyline River, near the bridge on the eastern bank which discharge raw sewage into the river. In order to terminate these discharge, either an interceptor sewer or individual small pump sumps would be required. Due to the difficulties in installing an interceptor sewer along the wall of the river, an allowance has been made to install a package pump sump with macerating pump in each of these premises to pump the sewage up to the main road and the trunk sewer between manholes EF 56 (9701) and EF 55 (9806) on Drawing No. 20367-BD-07.

Proposed Storm Network

A storm water network has been designed for Ballylongford using the design principles detailed in Appendix 3. The proposed storm network layout is detailed in Drawing No. 20367-LW-08.
Overall the topography in Ballylongford consists of several steep gradients falling towards the town centre. The proposed pipelines discharge at four locations, namely at two points on the Ballyline River and at two points on the stream flowing in from west of the town. The diameter of the proposed stormwater pipelines are between 300mm and 400mm would have sufficient capacity to cope with surface runoff from future developments. Details of the surface water network calculations are given in Appendix 3.

The estimated cost for the proposed stormwater network is €535,923. The detailed breakdown is included in Appendix 5 of the report.

It is inevitable that a certain amount of surface water will enter the foul network system, particularly from roofs and yards already connected to the system. Soak pits should be installed by householders to ensure minimum inflow of storm water into the foul network and this can be addressed at construction stage through public awareness training combined with detailed property surveys and potentially funding or other incentives for remedial works.

Any substantial development should have its own surface water drainage system, design on the principles of SUDS, which can then connect to the proposed storm water network. This is primarily as a method of preventing pollution but also due to flooding and watercourse issues.

PROPOSED TREATMENT

The primary purpose of a sewerage scheme is to maintain public health by preventing direct human contact with wastewater. Current legislation and ever increasing pressure on the environment, requires that this must be done in an environmentally sensitive fashion.

The ultimate goal of the treatment plant is to discharge an effluent which has as low an environmental impact as is reasonably possible and which complies with all legislative requirements.

In terms of design, a treatment plant must have the capacity to deal with both the anticipated hydraulic and organic loads over the lifetime of the treatment plant. The hydraulic load will determine the physical size of units and pipework within the plant. The organic load can then be treated by appropriate physical and/or biological processes.

In addition to the organic load, wastewater generally also contains nonbiodegradable
material, such as grit/plastics/rags, which can be removed by physical processes. This non-biodegradable load is becoming increasingly important as the general population becomes more and more removed from wastewater treatment, and bares little responsibility for what can end up in the sewer. Non-biodegradable items commonly disposed of in domestic toilets can be a cause of visible litter, and are often the first visible sign of an untreated effluent reaching a receiving water.

The liquid treatment stage may incorporate some or all of the following stages of treatment:

preliminary treatment
primary treatment
secondary treatment
tertiary treatment

Key Effluent Wastewater Parameters

Wastewater is generated as a result of human activity and excreta, and consists of about 99% water and 1% solids. The water carries particulate matter, but also contains dissolved organic and inorganic substances. The primary wastewater constituents of environmental concern are Biochemical Oxygen Demand (BOD), Phosphorus (P) and Nitrogen (N), in various forms. The various parameters are explained below for completeness.

Biochemical Oxygen Demand (BOD)
BOD is a measure of the amount of oxygen utilised by micro organisms to stabilise an organic waste. The BOD5 is a relatively crude test, but gives a good measure of the likely environmental effect of the organic matter in a sample. The BOD5 test is used extensively as a measure of wastewater strength, effluent quality and river water quality. As the saturation solubility of oxygen in water is about 10mg/l, under certain circumstances the BOD of a wastewater mixed with a receiving water can reduce the level of oxygen in the river to the point where fish-kills or other environmental damage due to lack of oxygen can occur.

Chemical Oxygen Demand (COD)
COD is a measure of the amount of oxygen chemically required to stabilise an organic waste. The COD is a quick and precise test, but gives an overestimation of the likely environmental effect of the organic matter in a sample, as it includes oxidation of organic material which may be biologically inert. As such the test is most useful when a correlation between BOD and COD has been established for a particular wastewater.

Phosphorus
Phosphorus can have a negative effect on a receiving water if the natural levels are exceeded. This is because Phosphorus is a limiting nutrient required for biological cell growth, and is usually in limited supply in fresh waters under natural conditions. Its lack of availability limits the amount of cell growth which can occur. If cell growth is not limited, Eutrophication can arise. Eutrophication is the process whereby excessive growth of algae or other plants occurs, followed by the subsequent utilisation of all oxygen in the water when decomposition of this excessive growth occurs.

Phosphorus is usually the limiting nutrient in freshwater, whereas Nitrogen is usually the limiting nutrient in the marine environment. The Phosphorus Regulations recommend very low concentration for MRP in rivers. The effluent discharge in this case is to an estuary however, and Nitrogen is usually taken as the limiting nutrient in the marine environment.

Nitrogen
Nitrogen occurs naturally in many forms, but essentially can cause an environmental problem in two forms, Ammonia (NH) and Nitrate (NO3). Unionised ammonia (NH3) in small concentrations can cause gill damage to fish, and can also lead to fatalities in the case of prolonged exposure. Nitrate while it is not particularly damaging to fish per say, has a maximum level permitted in drinking water for human consumption. Nitrogen, as mentioned earlier, can be a contributing factor in Eutrophication, usually in the marine environment.
Suspended Solids

Aside from grit and other non biodegradable items, wastewater typically contains about 1% solids. There are many different ways of fractionising the solids in wastewater, however the Total Suspended Solids (TSS) is a measurement commonly used by the EPA and in the related legislation. Of the key parameters TSS is typically the least critical, but can have a BOD associated with it, and is therefore of concern.

Wastewater Treatment Load

The proposed design p.e. for Ballylongford in 2026 has been estimated to be 1,200 p.e. as determined by the population projections in Appendix 1 of this report.

The basic design parameters for the wastewater treatment plant are therefore summarised as follows**:**

Table 1 – Ballylongford Influent Load

Parameter	Medium Growth	High Growth
Population Equivalent	1,200	1,600
Dry Weather flow (l/s)	3.13	4.17
Average BOD (kg/day)	72.00	96.00
Total Phosphorus (kg/day)	2.16	2.88
Total Nitrogen (kg/day)	13.20	17.60
Suspended Solids (kg/day)	91.00	112.00

Required Treatment

The wastewater collected at Ballylongford consists of primarily domestic wastewater, which will need screening and treatment. It is proposed to treat the wastewater at Ballylongford using a CAST system (Compartmentalised Aerated Septic Tank) followed by a package plant to remove further BOD and ammonia. The effluent will then be stored in a tidal tank for release at the appropriate tidal cycle to ensure maximum dilution of the effluent.

This treatment is based on the use of appropriate treatment to the location, in accordance with the Environmental requirements. Section 5.4 details the Waste Assimilative Capacity (WAC) at the discharge location. The WAC for the river

would indicate an onerous effluent standard. However the use of a tidal tank ensures discharge at high tide. The assimilative capacity in this scenario is large and indicates that minimal removal of pollutants is required on environmental grounds, however, given the environmental designations, it is felt prudent to minimise the impact of the wastewater on the environment.

The CAST / Package Plant / Tidal Tank system will provide compliance with the Urban Wastewater Treatment Regulations. Should the high growth scenario be reached, then Phase II can be constructed, which would be a further package plant to serve the larger population. The CAST tank would have the capacity to cater for this Phase II load.

Septic tanks are an effective means of treating domestic wastewater, working on the principle of fermentation and anaerobic digestion. Septic tanks have been used as a means of treating wastewater for many generations, however have fallen into disfavour in recent years primarily due to the resultant diffuse pollution of inland waters.

The general principle of the septic tank is settlement of particulate material, which can subsequently bio-degrade. The resultant effluent from a septic tank has much reduced levels of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Total Suspended Solids (SS). Due to the arrangement of pipework within a septic tank, septic tanks also capture oil, fats and grease and non-biodegradable materials such as grit/plastics/rags, and therefore provide a comprehensive form of wastewater treatment with no energy costs.

The main cause of failure of septic tanks is the blockage of the percolation area due to small amounts of particulate matter or rags passing through the system, eventually clogging the distribution system to the percolation area over time. Recent years have seen the successful introduction of mechanical filters to the effluent pipe of septic tanks, which has effectively solved the issue of blockage of the distribution system. These filters need cleaning on a scheduled basis. Septic tanks accumulate a sludge, which can be emptied out periodically by tanker and taken to an appropriate treatment centre, for full processing to separate the remaining biodegradable material from the non-biodegradable, and further treat the biodegradable material.

Another issue with septic tanks is odours due to the presence of anaerobic bacteria which produce Hydrogen Sulphide (H2S). H2S, formed as a result of anaerobic fermentation, is a gas which goes into solution, and subsequently gets released again when the wastewater is agitated. This can lead to odours emanating from the effluent pipe of the septic tank as the wastewater flows out and through the distribution system to the package plants.

This issue can be avoided by de-gassifying the effluent wastewater to strip out H2S and other odorous compounds continually, thus providing an odour free effluent, clear effluent. An ideal way to do this is with a Venturi aerator, which aggressively mixes the wastewater with air, providing an easy escape route for the H2S. This process is also efficiently adds oxygen to the wastewater, which ensures no further creation of H2S in the effluent, and results in an odour free effluent passing on to the package plants.
The CAST system can either be a single tank, or alternatively a series of tanks. In the case of Ballylongford, it is proposed to use a single septic tank due to the volume required.

The CAST system will not only reduce the BOD load from the village but will also act as a buffer, smoothing out peaks in loadings which can occur, which will aid the efficient operation of the package plant. The effluent from the CAST system will discharge to the package plant and from there the effluent will pass to the tidal tank.

The package plant proposed is based on fixed film process, as this has reduced operating and maintenance costs and provides the required level of treatment. As the BOD removal process is a respiration rather than growth process, smaller amounts of sludge are generated. Excess sludge from the package plant will be pumped to the CAST tank, where it will biodegrade along with the other solids in the tank, leading to reduced volumes for transport. The use of the CAST tank will also protect the package plants and help prolong the asset life.

The package plants will initially be connected in series and at a later stage, when the load to the plant develops, the flow can be diverted so the tanks are in parallel.

Wastewater Treatment Plant Site

The proposed treatment plant site is to the northern edge of the Development Boundary. The site is hidden from the road and adjacent to some agricultural buildings. It is also located at a low point thus minimising pumping heads.

Outfall / Foreshore Licence

It is proposed to use the existing northern outfall as the primary outfall for the entire village, however, given the environmental designations of the area, it would be recommended to seek a foreshore licence for the construction of a new outfall in the estuary at some future point. Whilst this outfall is not necessary at this point, the granting of a foreshore licence would enable the construction of a modern low impact, hidden outfall, and enable the removal of the existing outfalls, which have a negative visual impact of the location at low tide.

Proposed Foul Network

It is proposed to construct a new wastewater treatment plant on the eastern side of the village.
It is proposed to construct a new pumping station at the site of the existing holding tank at the western side of the village, to where the existing flows naturally gravitate. The pumping station will provide a storm water holding tank with a screened overflow to the river via the existing holding tank outfall. Duty & standby pumps will forward flows via 453m of 150mm diameter rising main to the proposed treatment plant.
Flows from the eastern side of the village will gravitate independently to the proposed treatment plant.
There is no requirement to extend the foul collection system, as the existing network serves all areas of zoned land within the adopted LAP development boundary
In relation to the existing combined system, it is proposed to replace 263m of gravity sewers with a diameter of less than 225mm to a minimum diameter of 225mm. Furthermore, it is proposed to upsize 173m of 300mm diameter sewer between the village centre and the proposed treatment plant site to 375mm diameter.

In addition extensive rehabilitation works to the existing foul network is required , including manhole rehabilitation, sewer relining, lateral repair, intrusion removal, etc.

Proposed Storm Network

The 2007 Preliminary Report recommends the construction of the following storm water sewers:-

A new gravity storm sewer running southwards along the R551 from Rusheen Estate, discharging to the Ballyline River. While the area to be serviced is outside of the adopted development boundary, it is already an established residential area, nut with a limited existing storm water infrastructure (557m of 400mm diameter sewer).

A new the gravity storm sewer running eastwards along the R551 to discharge to the proposed new 400mm diameter storm water sewer from Rusheen Estate (333m of 400mm diameter sewer). Again, the area to be serviced is outside of the adopted development boundary but is an established residential area without any storm water infrastructure.

A new gravity storm running westward along Bridge Street, from the bridge at the town centre to discharge to an existing 300mm diameter storm sewer, which in turn discharges to the Ballyline River (381m of 400mm diameter sewer).

A new gravity storm sewer, connecting to the existing box culvert on Well Street, running westwards along Well Street and discharging to the Ballyline River (406m of 300mm diameter sewer).

A new gravity storm sewer running northwards along Main Street, discharging to the existing storm water sewer from the GAA club car park, which in turn discharges to the Ballyline River (234m of 400mm diameter sewer).

PROPOSED TREATMENT WORKS

It is proposed to provide a treatment plant for the village at a site to the north of the village centre, as identified in the 2007 Preliminary Report, to cater for a future (2028) design population equivalent of **1,200pe**.

Design Criteria

The design criteria for the proposed treatment in Ballylongford are set out in Table 2 below:-

Table 2: Design Criteria for Proposed Treatment Plant

Parameter	Unit Design	Criteria
Population Equivalent	nr	1,200
Per capita flow	l/c/d	180
Dry Weather Flow	m^3/d	216
Flow to Full Treatment 3 DWF	m^3/d	648
BOD Load per Capita	kg/c/d	0.06
BOD Load per Day	kg/d	72

Details of Proposed Wastewater Treatment Plant

The proposed treatment plant will discharge to the Ballyline River, which is tidal at the point of discharge. The river in turn discharges to the Lower Shannon Estuary at Ballylongford Bay.
The following legislation was considered in establishing the proposed discharge standard from the WwTP:-

- Neither the Ballyline River, nor the Shannon Estuary at Ballylongford Bay is designated "sensitive" under the Third Schedule to the Urban Waste Water Treatment Regulations
  2001. The Regulations specify that discharges from agglomerations with a population equivalent of less than 2,000 to freshwater and estuaries not designated as sensitive shall be subject to "appropriate treatment". This is defined as " treatment of urban waste by any process and or disposal system, which after discharge allows the receiving water to meet the relevant quality objectives and the relevant provisions of the directive and of other community directives".
- The Local Government (Water Pollution) Act, 1977 (Water Quality Standards For Phosphorus) Regulations, 1998 (SI No. 258 of 1998) oblige local authorities to maintain or improve the water quality of rivers by 2007 by reference to the Q-Rating (biotic index) or the concentration of molydbate reactive phosphate (MRP). These Regulations do not apply to estuarine waters.
- The Ballyline River is not a designated salmonid river under the EC (Quality of Salmonid Waters) Regulations 1988 (SI No. 293 of 1988). However, the Shannon Estuary Water Quality Management Plan states that many tributaries of the Shannon estuary support salmon stocks, and consequently it is proposed that the water quality parameters necessary for the passage of these species should apply over the full extent of the Shannon estuary.
- There are no bathing areas, as designated under the Quality of Bathing Waters Regulations 1992 (SI No. 155 of 1992) and subsequent amendments – (SI No. 145 of 1994, SI No. 230 of 1996, SI No. 177 of 1988 and SI No. 22 of 2001), within the vicinity of the proposed discharge.
- There are no shellfish production water, as designated under the EC (Quality of Shellfish Waters) Regulations 2006 (S.I. No. 268 of 2006), within the vicinity of the proposed discharge. However, the Department of Agriculture, Fisheries, and Food propose to extend the current designation to include an additional 49 (forty-nine) water bodies, including Ballylongford Bay.

Nicholas O'Dwyer Ltd. carried out an assessment of the assimilative capacity of the receiving waters with respect to the relevant legislation noted above, as part of their 2007 Preliminary Report. While the proposed discharge is to estuarine water, a conservative assimilative capacity assessment was undertaken by assuming that the discharge was to freshwater flow only from the Ballyline River.

The assessment concluded that if the discharge was to the freshwaters of the Ballyline River, a maximum BOD concentration of 15mg/l would be required. Consequently, it is proposed to use a tidal tank to store treated effluent and only release the effluent to the river during periods of maximum dilution. A discharge standard of 35 mg/l is proposed for suspended solids in line with the Urban

Wastewater Treatment Regulations for discharges from urban wastewater treatment plants.
The assimilative capacity assessment shows that there is no requirement for specific phosphorus, nitrate, or ammonia removal if a tidal tank is used.

Secondary treatment is proposed to cater for existing and future wastewater discharges from Ballylongford to meet the 25/35 discharge standards prescribed Part 1 of the 2nd Schedule to the Urban Wastewater Treatment Regulations.

The European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), giving effect to the EU Water Framework Directive 2000/60/EC, require public authorities to establish an integrated monitoring and management system for all waters, to develop a dynamic programme of management measures and to produce a River Basin Management Plan. This requirement is being implemented through the establishment of river basin management projects for River Basin Districts, of which there are eight in Ireland. The Ballyline River and Ballylongford Estuary are included within the Shannon International River Basin District (SHIRBD). The Management System for SHIRBD is currently under development and no standards have yet been prescribed.

It is intended that a Draft River Basin Management Plan be released for public consultation in 2008, but to date this has not been published. When agreed, the Plan and its associated Programme of Measures may have an impact on the eventual discharge standards specified for the proposed treatment plant in Ballylongford.

The Preliminary Report proposed that the new wastewater treatment plant would consist of the following:-

- Inlet pump sump and pumps.
- Preliminary and primary treatment using a CAST (Compartmentalised Aerated Septic
- Tank) tank, to remove suspended solids and reduce the BOD load to the package
- plants.
- Package secondary treatment plants.
- Effluent pump sump and pumps
- Tidal tank
- Control building.

In addition, allowance is made in the cost estimate for the provision of UV disinfection of
effluent, should Ballylongford Bay be designated a shellfish production water.

Kerry County Council

Comhairle Contae Chiarraí

COUNTY KERRY WASTEWATER AND SLUDGE PROJECT - ADVANCE STUDY

PRELIMINARY REPORT
BALLYLONGFORD

Revision B - September 2007

Nicholas O'Dwyer
CONSULTING ENGINEERS

KERRY COUNTY COUNCIL

COUNTY KERRY WASTEWATER AND SLUDGE PROJECT
ADVANCE STUDY

BALLYLONGFORD PRELIMINARY REPORT

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Rev B - September 2007

PROJECT NO. 20367		Prepared by		Approved by		Issued by	
		Initials	Date	Initials	Date	Initials	Date
Revision	Reason for Revision	CN	29/08/06	MD	29/08/06	ND	29/08/06
A	Incorporate Client's Comments	MR	30/03/07	MD	1/04/07	ND	11/04/07
B	Incorporate Client's Comments	MR	10/09/07	MD	10/09/07	ND	10/09/07
C							
D							

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1.0 EXECUTIVE SUMMARY

This Report has examined the options and costing for the provision of a sewerage scheme for the village of Ballylongford in County Kerry.

The existing population equivalent at Ballylongford is estimated at 667 p.e. A Development Boundary was developed in consultation with Kerry County Council and population growth figures indicated the population equivalent of Ballylongford rising to 1,015 p.e. by the year 2026.

The village is currently served by a wastewater collection network, and the network is in reasonable to good condition but in need of localised repair. The network covers most of the Development Boundary extents, but some network extensions are required.

Due to the large assimilative capacity of Ballylongford Bay, combined with the relatively small population, only a basic wastewater treatment system is required. However, due to the environmental designation of the estuary it is proposed to use a CAST system followed by a package treatment plant and tidal release.

The estimated capital costs for the provision of network repairs, upgrades and extensions, with a CAST Treatment system, is €2,282,720 (including VAT).

The whole life costs of the scheme amount to €11,777 per existing house, which provides a value for money cost.

Due to the relatively small scale of the scheme, it is recommended that the scheme be progressed as a sub part of a larger scheme. This should provide better value for money to Kerry County Council.

The Capital Cost of the proposed Storm Network is €535,923 (inc VAT).

2.0 PLANNING AND INFRASTRUCTURE ISSUES

2.1 General

Ballylongford is located in the north of County Kerry on the Shannon Estuary and is spread over two district electoral divisions – namely Lislaughton and Carrig. It is approximately 60 km west of Limerick, and 12 km north of Listowel as illustrated in Figure 2.1. The town gets its name from the fort that led to ancient "Longphuirt". It is a coastal village surrounded by low lying and relatively flat land, dominated by grassland and pastureland for cattle production.

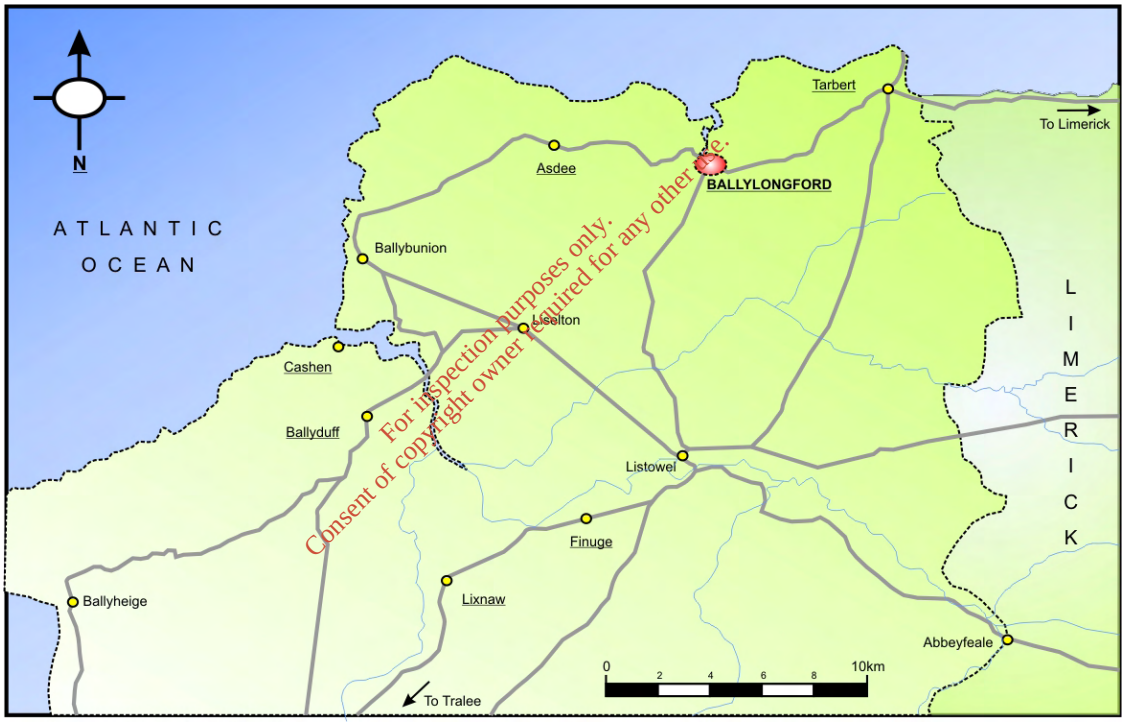

Figure 2.1 – Location Plan

The Development Boundary, as agreed with the Planning Section of Kerry County Council, is illustrated in Figure 2.2 and shown on Drawing No. 20367-BD-01. The Aerial Photography of the village is illustrated in Figure 2.3, showing the largely agricultural nature of the area.

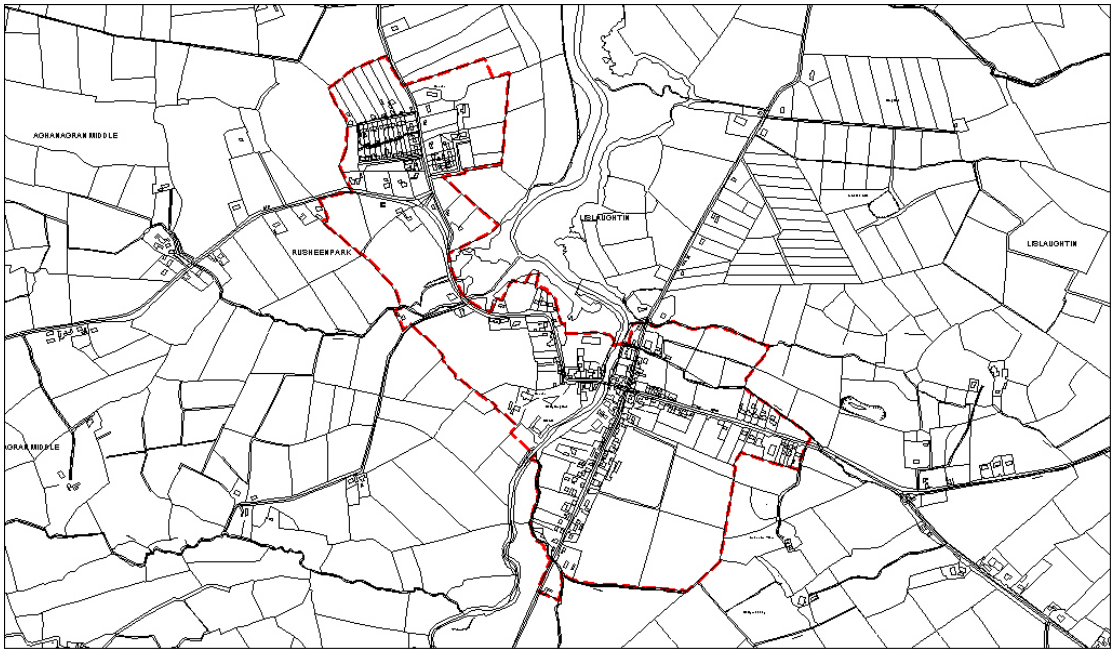

Figure 2.2 – Ballylongford Development Boundary

Figure 2.3 – Aerial Photography of Ballylongford

2.2 Topography

The general topography is illustrated in Figure 2.4. As can be seen, the topography of the area within the development boundary is generally flat with the land in the distance rising to the east, west and south forming a valley around Aghanagran Middle, Ballymacasy and Lislaughtin areas. Higher grounds can be found northwest of the village near Rusheen and east of the village close to the development boundary at Ballymacasy. Although the gradients are relatively flat within the village, the village naturally drains towards the three primary watercourses in the area. The town is separated by the Ballyline River and the eastern region of the village including Ballymacasy and Lislaughtin areas drains to that river. The western region of the village drains to the Ballyline River in Ballylongford Bay except for Rusheen Park which drains to the Aghanagran River. Figure 2.5 illustrates the drainage paths in Ballylongford. The results of the topographical survey are presented in Appendix 2.

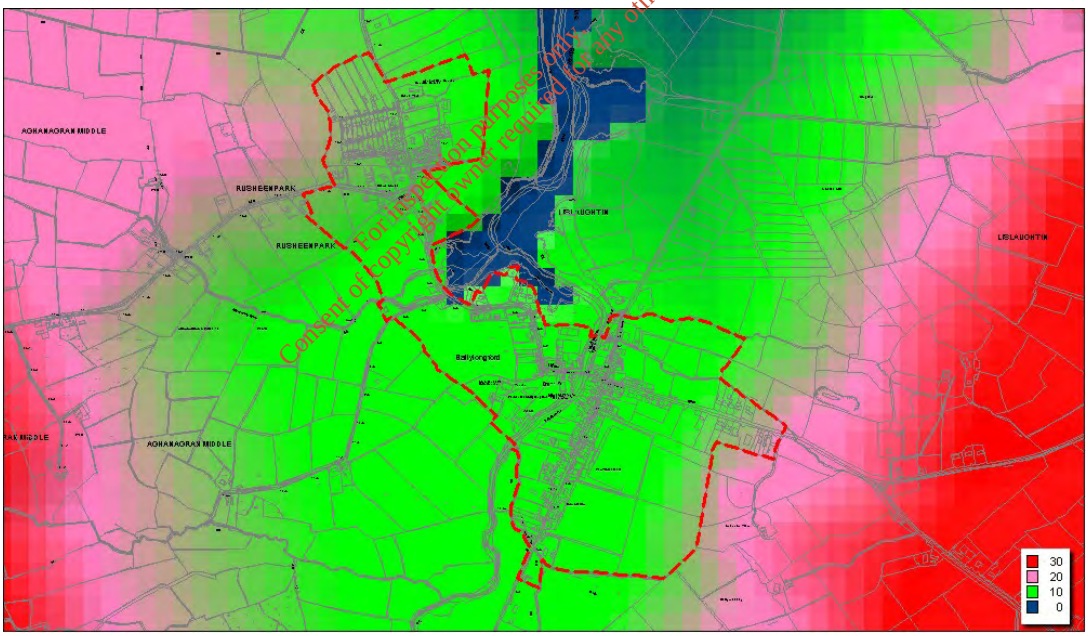

Figure 2.4 – Topography from Digital Elevation Model

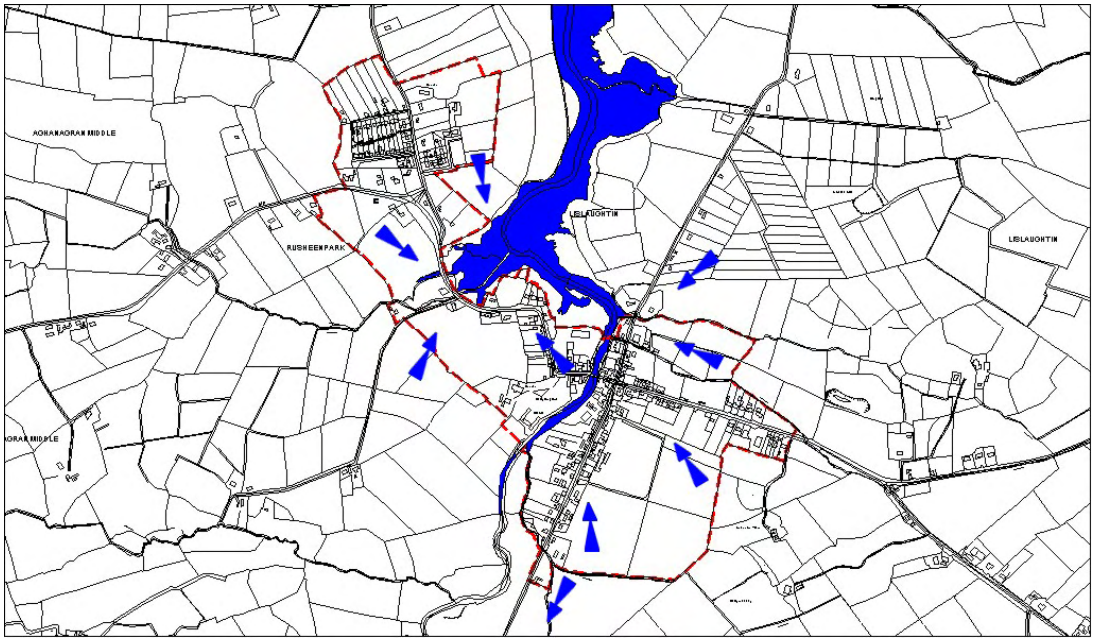

Figure 2.5 – Drainage Paths

2.3 Planning Constraints

The village is served by a water distribution network and a wastewater collection network. The village has been listed as an "Area of Special Interest Pending Designation as Architectural Conservation Area" and it is noted that there are several protected structures within the village.

Lands have been identified in the Ballylongford / Tarbert area as suitable for industrial development and employment creation and the Minister for Enterprise Trade and Employment announced a 600 acre development in this area in May 2006.

2.4 County Development Plan

The Kerry County Development Plan was prepared under the provisions of the Planning and Development Act 2000, and was made policy in December 2003. The County Development Plan covers the period 2003 to 2009.

The policies and objectives contained in the Plan have been developed in recognition of the unique landscape and heritage of the County, and provide the overall plan for sustainable development in the County.

County Kerry has seen a general shift of population from rural to urban centers, which has resulted in a general decline of small villages and towns in recent census years. The County Development Plan defines a hierarchy of population centers, under which Ballylongford is classified as a "Village". The plan defines villages as development centres providing for convenience and daily needs and small scale employment opportunities for the residents and surrounding rural population. They also provide local and community services such as primary schools, churches, local sporting facilities and a community hall.

As such, an objective of the County Development Plan is to promote the strengthening of existing rural villages as a focus for the development of rural areas in the future, by making them more attractive places to live. The strengthening of the locations will take place by a provision of infrastructure to encourage economic growth.

The County Development Plan reviews the National Spatial Strategy, under which, large sections of North Kerry, including Ballylongford, have been identified as rural areas with a strong potential for diversification. Tralee and Killarney have been identified as hubs, with a development corridor between the two. Listowel has been identified, as "Urban Strengthening Opportunity".

The provision of adequate water supply and sewerage facilities is an integral part of proper planning and sustainable development of any area and the County Development Plan sets out the objective of facilitating the provision and upgrading of water supply and sewerage schemes throughout the County in accordance with the priorities of the settlement hierarchy.

Village strengthening is a key objective of the National Spatial Strategy. The key objective of the Regional Planning Guidelines seeks to encourage the organic growth of towns and villages and seeks to focus target growth towards towns and villages to prevent sprawl into the open countryside. The village has suffered population decline in recent years with little private residential development. The Planning Authority seeks to strongly encourage residential development within the village boundaries. Ballylongford is included in the settlements where infrastructure will be upgraded under the water services investment programme in the next 5 years.

2.5 Watercourses

A unique and relatively unspoiled and natural environment of rivers, tidal estuary, bogs and open farmland surrounds Ballylongford. The Aghanagran and Ballyline Rivers meet in Ballylongford and flow through the estuary wetlands past the ruins of the Lislaughtin Abbey and the Carrigafoyle Castle to meet the Shannon Estuary in Ballylongford Bay. The estuary provides the setting for a rich and varied bird life throughout the year.

The coastal area around Ballylongford is designated as a Special Area of Conservation (SAC) and National Heritage Area (NHA), as illustrated in Figure 2.6 and shown on Drawing No. 20367-BD-11. There are many walkways around the area and on Carrig Island and Ballylongford is one of the stops on the North Kerry walking path. Shellfish are cultivated in the area and form the basis for the Oyster Festival which occurs annually in September.

The wastewater discharge location is a significant distance upstream of the designated mussel production area in Ballylongford Bay and therefore is not a source of contamination to the production.

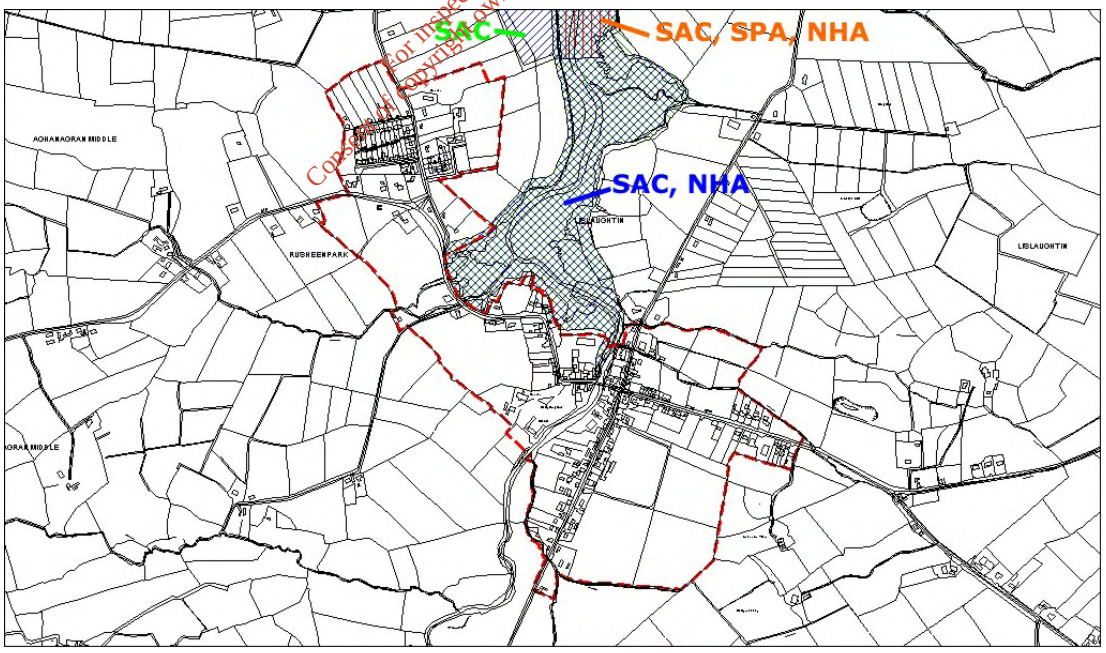

Figure 2.6 – Environmental Designations

2.6 Existing Wastewater Loads

To determine the actual flows and loads that are discharged from the sewer network in Ballylongford, independent flow and load surveys were conducted in February 2006. A copy of the report can be found in Appendix 8 of this report. A seven day flow and load survey was carried out between the Tuesday, 7th February to Tuesday, 14th February 2006 in Ballylongford.

The analysis was carried out using 24 hour time proportional composite samples, thus one per day. Monitoring was carried out at two locations to determine the total load in Ballylongford. One monitoring point was at the downstream end of the western network and the other at the downstream end of the eastern network. The results of the survey are presented in Figures 2.7-2.9 below. The various parameters monitored in the survey are fully explained in Section 5.1.1.

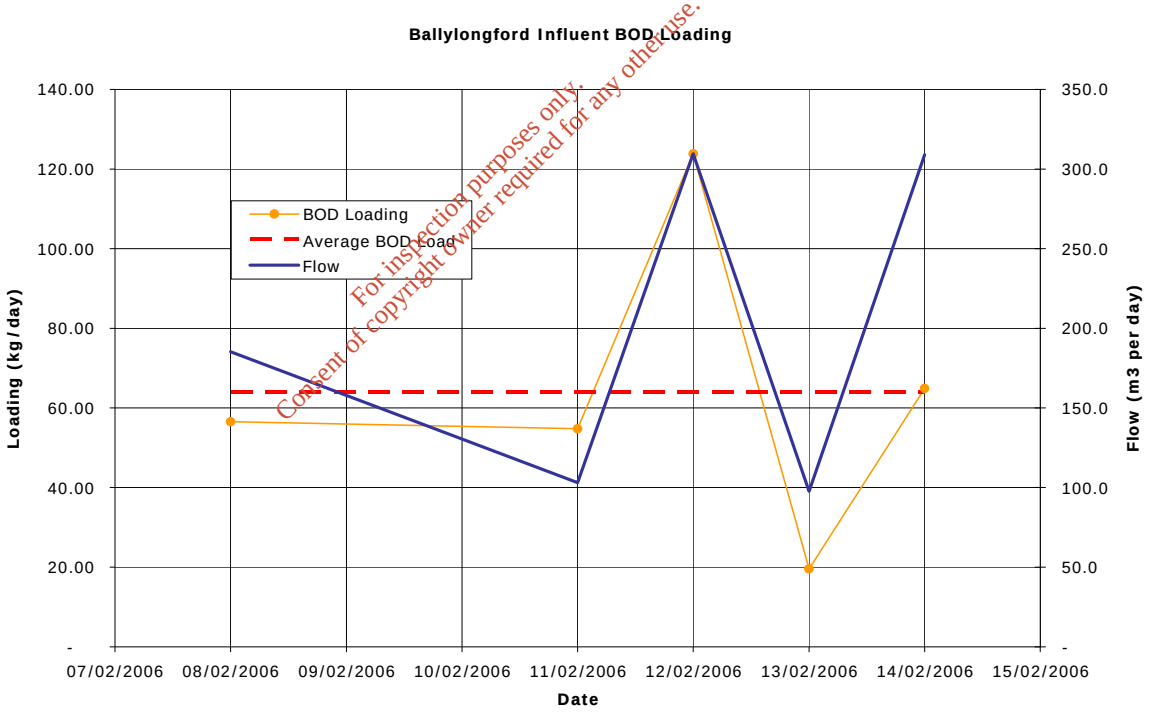

Figure 2.7 – Ballylongford Influent BOD Loading

There was significant variation in the BOD concentrations ranging from 40 to 530 mg/l, with an average BOD concentration of 305 mg/l. This would be considered a high strength effluent, as typical domestic effluent would have an expected concentration in the range 250 mg/l to 300 mg/l.

Table 2.1 – Influent BOD Data

	BOD Loading (kg/day)	Equivalent PE (at 45 g BOD/pe)
Average	63.90	1,420
Max	123.84	2,752
Min	19.54	434

The residential population as determined by house count in Section 3.2 is 667. The residential population estimated by the Census in 2002 was 405 p.e. The average load over the seven day period was 63.90 kg/day which is equivalent to a p.e. of 1,400. This is very high in comparison with both the existing population and the estimated census population from 2002. There are currently no industrial discharge licences in Ballylongford that have been issued by Kerry County Council. The BOD concentrations recorded are not consistent with normal municipal effluent.

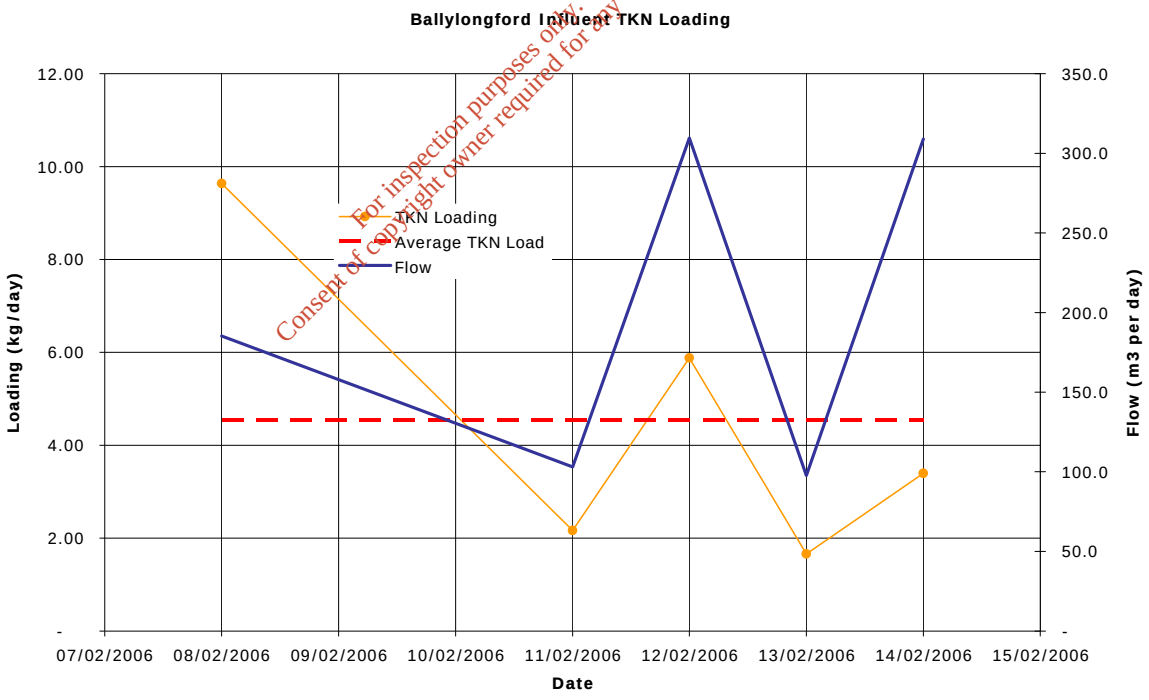

Figure 2.8 – Ballylongford Influent TKN Loading

The average Total Kjeldahl Nitrogen (TKN) concentration in Ballylongford was 21.0 mg/l. Typical domestic concentrations would range between 45 and 60 mg/l. This concentration would be typical of a weak municipal effluent.

Table 2.2 – Influent TKN Data

	TKN Loading (kg/day)
Average	4.55
Max	9.64
Min	1.66

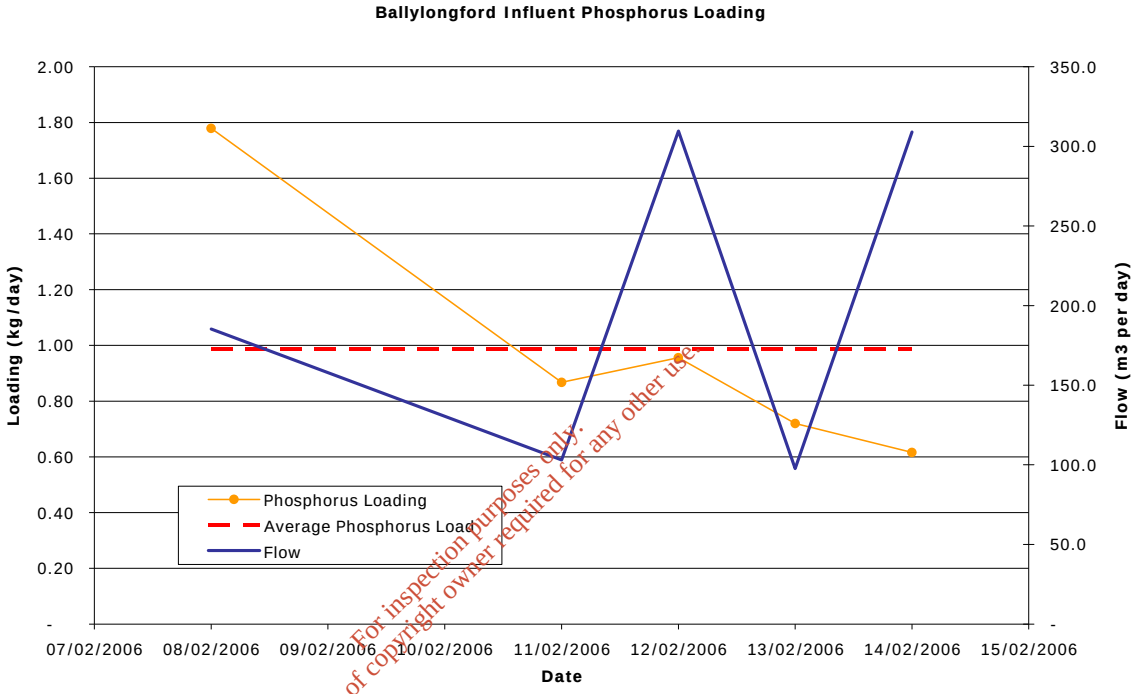

Figure 2.9 – Ballylongford Influent Total Phosphorus Loading

The average Total Phosphorus concentrations in Ballylongford was 4.69 mg/l and typical domestic concentrations would range from 8 to 12 mg/l. This is again typical of a weak municipal effluent.

Table 2.3 – Influent Total Phosphorus Data

	Phosphorus Loading (kg/day)
Average	0.99
Max	1.78
Min	0.62

Ballylongford monitoring was not satisfactory due to the tidal influence at these locations. BOD Concentrations were generally higher than normal for municipal wastewater but TKN and Phosphorus concentrations were on average lower than

expected. Flow volumes ranges from 98 to 310 cubic metres per day. During the sampling period a total rainfall of 5.1 mm was recorded, with 3.1 mm falling on 14th February 2006.

2.7 Existing Water Supply Infrastructure

Ballylongford town is serviced by a public water supply which serves a population of approximately 650 with a surface water supply delivering approximately 257 m^3/day. The water mains run along the main R551 from Tarbert through the town of Ballylongford and onto Asdee. It offers a considerable supply to the north and south of the town's main crossroads and also services the residential council estate to the north west of the town. This is illustrated on Figure 2.10.

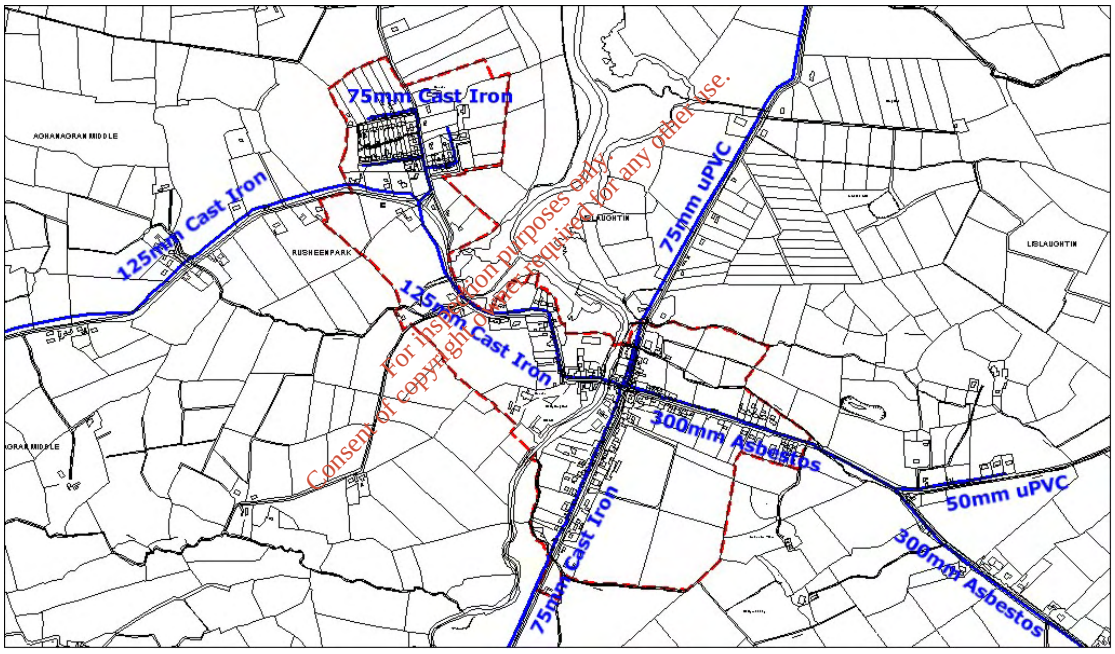

Figure 2.10– Existing Water Distribution Network

2.8 Existing Wastewater Infrastructure

Ballylongford is currently served by two foul gravity sewer systems. The systems are separated by the Ballyline River, as illustrated in Figure 2.11. There are also existing storm sewers with several outfalls in Ballylongford. The system to the west drains to a holding tank that ordinarily discharges by gravity to the foreshore. During times of high tide, a pumping arrangement is used to affect discharge from the holding tank. The system to the East is a gravity discharge directly to the river via box culvert that is approximately 150 m long. This culvert

is visible at low tide. The system to the East has the largest contributing load and the amount of storm water connections to the system have been noted as a cause of concern.

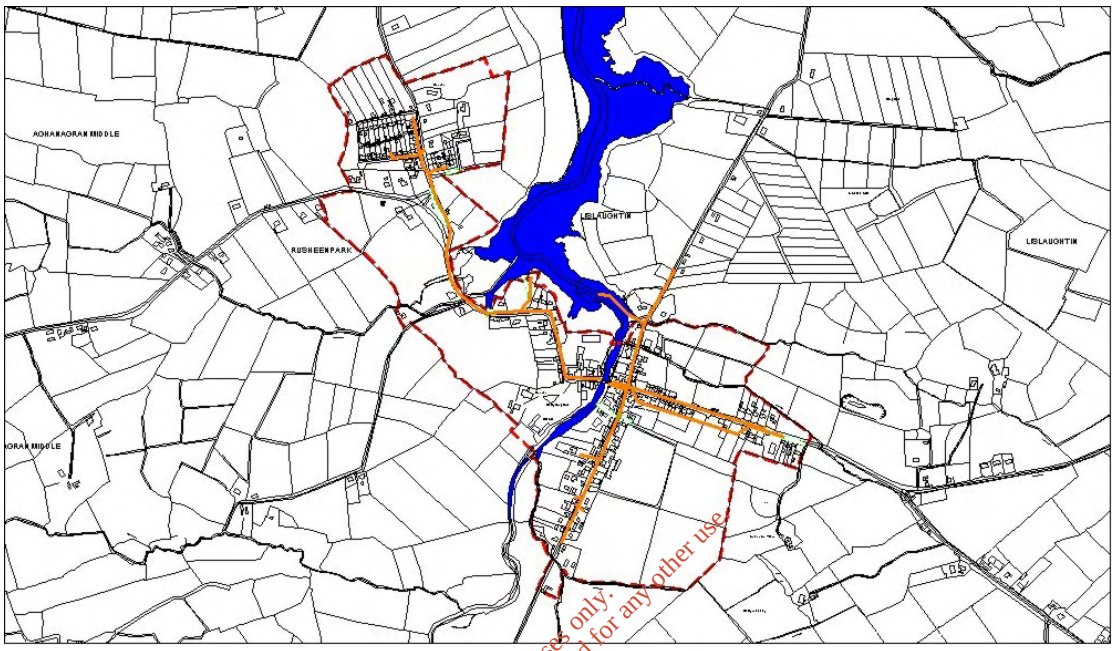

Figure 2.11 – Existing Wastewater Collection Network

Due to limitations regarding available information on the existing collection and treatment systems in Ballylongford, the following survey work was performed in order to establish the extent, detail and condition of the wastewater collection and treatment system:

- Manhole Location and Sewer Inspection Survey

  The manhole location and sewer inspection survey was carried out by USA Ltd.

- Asset Survey

  The asset survey was performed by Nicholas O'Dwyer Ltd. The results of the survey are detailed below.

2.8.1 *Existing Sewerage Network*

The village is served by a foul drainage network consisting of approximately 3,256 linear metres of gravity pipelines. The network is primarily made up of 225 mm diameter concrete pipelines. The system gravitates flow to the East and gravitates/pumps from the system to the West, depending on the tidal conditions.

A summary of the existing sewerage network is given below in Table 2.4. Details of the existing storm sewers are not included in the table due to insufficient information available.

Table 2.4 – Summary of Existing Sewerage Network

System Type	Pipeline Diameter (mm)					Total Length (m)
	150 ≤	225	300	450	600	
Foul/Combined	572	2,179.1	495	-	-	3,246.1

The results of the sewer condition inspection survey have been used to assign structural and service grades between 1 and 5, with 5 being the most critical, in accordance with the *"Sewerage Rehabilitation Manual"* published by WRC, to the existing sewers in Ballylongford. The structural and service grades assigned are summarised below by length of sewer in Tables 2.5 and 2.6 respectively.

Table 2.5 – Summary of Structural Grades

System Type	Structural Grade By Length (m)				Total (m)
	5	4	<4	Not Surveyed	
Foul	183	98	940	2,005	3,246

Table 2.6 – Summary of Service Grades

System Type	Service Grade By Length (m)				Total (m)
	5	4	<4	Not Surveyed	
Foul	48	274	899	2,025	3,246

It can be seen from Tables 2.5 and 2.6 that the existing sewerage network is in reasonable structural condition (77% of surveyed network less than grade 4) and reasonable service condition (74% of surveyed network less than grade 4). It should be noted that 62% of the network was not surveyed, due to buried manholes and access issues, and is therefore in unknown condition. The

structural and service grades assigned to the existing sewers are shown in Drawing Nos. 20367-BD-12 and 20367-BD-13 respectively.

2.9 Private Wastewater Treatment

Private wastewater treatment consists of a wastewater treatment system attached to each individual dwelling. As such, the householder is responsible for the operation and maintenance of the treatment system. The effluent form individual treatments plants is typically unmonitored and therefore their performance or the cumulative environmental effect is unknown. From a public health and quality of life point of view, centralised collection and treatment of wastewater is preferable to private wastewater treatment systems. The sewer system in Ballylongford reaches the extents of the proposed development boundary so the majority of houses in the town have a connection to the collection system.

2.9.1 *Package Wastewater Treatment Plants*

As the majority of houses within the development boundary are connected to the public sewer, there are very few residential houses in the catchment area which have proprietary wastewater treatment units. A number of houses may have installed package units outside the development boundary. These units typically incorporate coarse screening, primary settlement, biological treatment and final settlement. The treated effluent is normally discharged to a percolation area which requires a certain reserved land area within the property of the dwelling. The effluent quality would be expected to be of a higher standard than can be achieved with a septic tank.

2.9.2 *Private Septic Tanks*

A number of houses that lie outside the development boundary may have installed septic tanks to treat domestic wastewater. A significant proportion of these tanks would have been constructed before 1990 (pre SR6). This indicates that they would not comply with current environmental standards. Septic tanks provide an efficient means of treating domestic wastewater, however, septic tanks do benefit from a minimum level of maintenance, which is not always achieved in practice. The primary negative issue is that of diffuse pollution of inland waterways. A percolation area is also required and there are planning

rules on septic tank locations and percolation areas which must be adhered to, imposing limits on the minimum amount of land required for a single dwelling.

2.10 Existing Surface Water Infrastructure

There is currently a small amount of surface water infrastructure in Ballylongford town mainly consisting of box culverts which drain to land drains and the Ballyline River. There is a box culvert which is located behind a number of houses on the R551 heading to Tarbert before it runs under the road close to the main crossroads and discharges to a land drain. Another box culvert takes surface water from the GAA car park and discharges to the Ballyline River. A number of houses are also picked up at the west side of Ballylongford by a box culvert which discharges both to the estuary and the Ballyline River. There are also a number of short runs of storm pipework to the north west of the town picking up surface water from a residential estate. The storm sewers, as surveyed by the CCTV contractor, are illustrated in Figure 2.12. The storm sewers as shown on Drawing Nos 20367-BD-02 and 20367-BD-05.

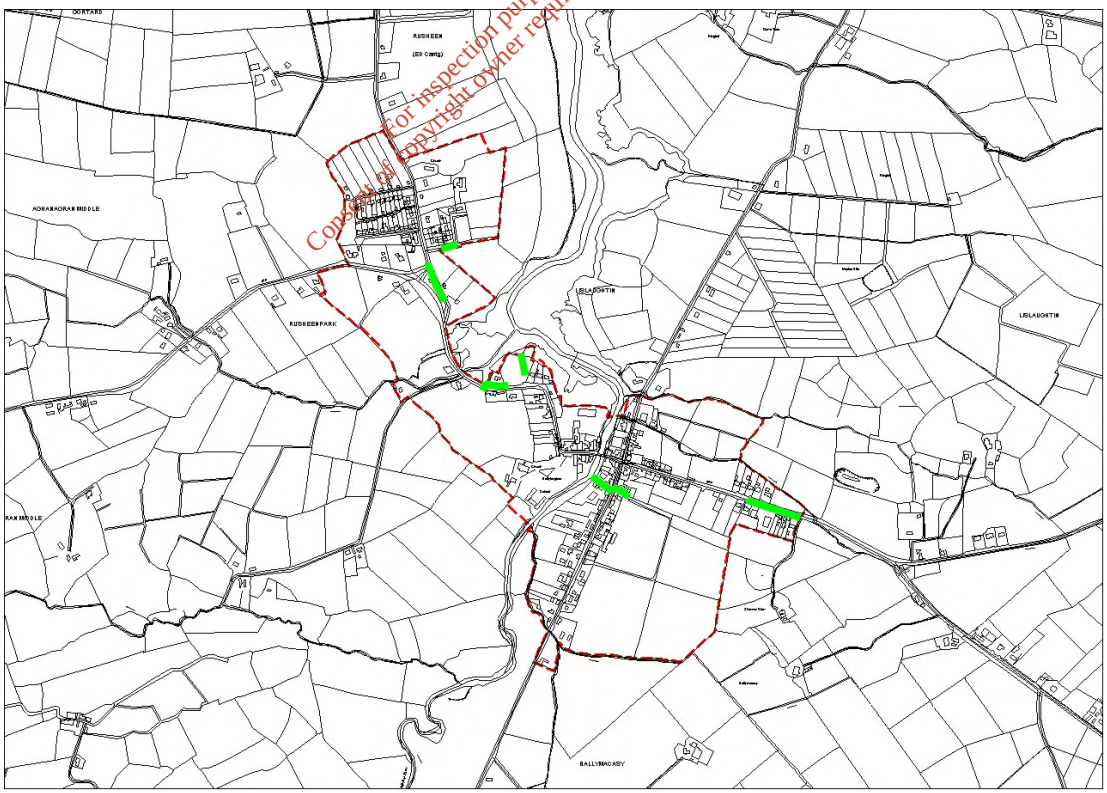

Figure 2.12 – Storm Sewers

2.11 Recommended Storm Water Management Policy

Traditionally, surface water runoff from new developments would be discharged to the nearest available receiving water. However, this has had the following detrimental effects:

- The catchment response is accelerated as the time of flow from a directly connected development is vastly shorter than a green-field site. This shortens the time to peak flow in a catchment
- The groundwater recharge is lowered.
- Storm water discharge directly to receiving waters from separate storm water drainage pipe networks has been found to have substantial pollution potential associated with high levels of suspended solids and organic matter washed off during rainfall, together with misdirected foul connections. As a result, the water quality of rural receiving waters can become degraded from draining the storm water of new development areas.

The detrimental effects of traditional storm water drainage, listed above, are inconsistent with the principles of sustainable development. In order to combat these adverse effects of traditional drainage design, recent national and international practice has been to:

- Limit the forward flow from newly developed areas to a pre-determined green-field value and to safely store the excess flow until such time as it can be cleared. This can help alleviate the risk of flooding by maintaining the existing catchment rainfall – runoff response.
- Incorporate Sustainable Drainage Systems (SuDS) based on Best Management Practices (BMPs), which can slow down the runoff of rainfall to receiving waters and allow infiltration of run-off to the soil. This can protect natural groundwater recharge; hence improve through filtration the quality of storm water.

Increased development in the town will involve the covering of green-field areas with impermeable material and could result in an increase in the proportion of rainwater contributing to immediate surface runoff. In the case of a significant development this could be an issue.

Despite this, it is recommended that a sustainable drainage policy be developed and enforced by Kerry County Council for all new developments within

Ballylongford. Each development will need to be assessed individually for an acceptable storm water runoff rate and, where possible, SuDS technology should be incorporated into the drainage layout for the site. Individual dwelling should incorporate soak pits for rainwater, primarily as a method of preventing infiltration into the existing foul sewer system

Table 2.7 below indicates the typical Permissible Outflow Rates for developments of different sizes. These outflow rates are calculated using a SOIL index value of 0.45 and a SAAR (Standard Annual Average Rainfall) value of 1,200 mm. These catchments characteristics were obtained from the Flood Studies Report, 1975.

Table 2.7 – Permissible Outflow Rate

Soil Class	4	
Soil Index	0.45	
Development Area (ha)	Permissible Outflow Rate	
	l/s	l/s/ha
0.5	6.85	13.70
1	12.69	12.69
2	23.52	11.76
3	33.74	11.25
4	43.59	10.90
5	53.16	10.63
6	62.53	10.42
7	71.73	10.25
8	80.78	10.10
9	89.70	9.97
10	98.52	9.85

Further reference should be made to:

- Storm Water Management Policy for Developers, Dublin City Council, (1998).
- Flood Studies Report, National Environment Research Council, (1975).
- CIRIA No. 521 - SuDS Design Manual.
- Greater Dublin Strategic Drainage Study – Environmental Policy.

3.0 PROPOSED PROJECT

3.1 Context

It is proposed to provide wastewater collection and treatment facilities for the town of Ballylongford adequate to serve the town for a period of 20 years. The existing treatment facilities at Ballylongford are inadequate and the EPA report that the Ballyline River is suffering from moderate pollution due to suspected agricultural sources. The town would benefit from improved treatment facilities, as it would allow the town to infill and develop from a socio-economic point of view.

3.2 Design Population

An existing house and commercial premises count was carried out within the development boundary of Ballylongford in March 2006 using the An Post Geodirectory and the findings are as detailed in Appendix 1. A search on the Internet and iPlan revealed the number of planning permissions that had been approved or awaiting permission within the proposed development boundary.

The existing population equivalent estimate is based on the following figures:-

Domestic Household	2.9 p.e. each
Shops	1.0 p.e. each
Licensed Premises	3.0 p.e. each
Post Office	1.0 p.e. each
Commercial Offices	1.0 p.e. each
Hairdressers	2.0 p.e. each
Church	1.0 p.e. each
Primary School	0.2 p.e. each per student
Garages/Car Repair	1.0 p.e. each
Community Centre	1.0 p.e. each
Garda Station	1.0 p.e. each
Fire Station	1.0 p.e. each

The existing population for Ballylongford is based on the following information as listed in Table 3.1 below:

Table 3.1 – Existing Development - Ballylongford

Description	No.	p.e.
Existing Domestic	210	609
Shops/Supermarkets	3	3
Public Houses	6	18
Post Office	1	1
Commercial Offices	3	3
Hairdressers/Beauty Salon	2	4
Church	1	1
Primary School (Scoil Oilbhear Naofa no. of pupils)	104	20.8
Garages/Car Repair	4	4
Community Centre	1	1
Garda Station	1	1
Fire Station	1	1
TOTAL		**666.8**

The Housing Strategy for Kerry County Council as outlined in the County Development Plan determined that the projected average household size for 2006 would be 2.94 people per household. Therefore it was prudent to assume a value of 2.9 people per household to determine the existing and future populations at Ballylongford. A review of census data was also undertaken to assess the potential growth. One of the areas to show a decline in population in County Kerry is the Listowel Electoral Area. This is a traditionally strong agricultural area which has been badly hit by a decline in farming employment since 1991.

Regional population projections from 2006 to 2021 were issued by the CSO in May 2005. Six possible scenarios were put forward in these projections, all of which show an increase in population for the south-west region over the period at a growth rate of 0.9 – 1.1%[1].

However projected growth rates have been calculated based on the residential area available within the Development Boundary for Ballylongford. This development plan was submitted to and approved by the Planning Department of Kerry County Council. Therefore, the projected population growth for Ballylongford is based on the existing planning permissions being developed by 2010 and from then based on the following:

[1] Regional Population Projections 2006 – 2021 published by Central Statistics Office 25th May 2005.

i) High growth rate

Residential development area available within development boundary of 38 hectares. Permitted residential development may only be half of this area due to future rezoning issues which results in an area of 19 hectares. This is equivalent to a fixed annual growth rate of approximately 4.08%, and results in a population equivalent of 1,430.

ii) Medium growth rate

Permitted residential development within development boundary assumed to be only a quarter of zoned residential area due to future rezoning issues. This is equivalent to a fixed annual growth rate of approximately 2.04%, and results in a population equivalent of 1,042.

iii) Low growth rate

The Census Report published by the CSO in 2002 showed that the population in Kerry County increased by 5% over the intercensile period from 1996 to 2002. Therefore fixed annual growth rate at 0.83% per annum, and results in a population equivalent of 861.

It is assumed that any planning applications that have been approved within the proposed development boundary will be constructed by 2010.

Commercial/Institutional development in Ballylongford must also be considered. An additional area of approximately 3.5 Ha has been assumed for institutional development. By determining standard light industry requirements in terms of water consumption, an additional population equivalent of 154 p.e. was calculated. This figure will be the total commercial population equivalent for 2026 and will apply to the high, medium and low scenarios. The 2026 design p.e for Ballylongford can therefore be estimated at 1,200 p.e. and this provides sufficient capacity to cater for the medium growth of the town.

It should be noted that if some significant development takes place in the town for whatever reason, the design populations could be significantly different. It is possible that the availability of an improved public sewerage scheme would be a factor in enticing development to Ballylongford, but at this stage it is difficult to quantify this.

3.3 Scheme Boundary

The scheme boundary was developed in conjunction with the Planning Department of Kerry County Council. This was based on the need to infill the existing village and prevent an uncontrolled spread of dispersed housing around the area, but in particular to join the East and West sides of the village, and form once continuous village. The determination also allowed for a significant area of green space to be incorporated in accordance with the development plan aims.

3.4 Phasing

It is anticipated that the first phase of this scheme would be sufficient to cater for 20 years. However, it is likely that the availability of a fully functional public sewerage scheme could make the area more attractive to development. The purpose of phasing is to construct a treatment system in line with demand, for economic and technical reasons. In technical terms, some treatment systems do not operate well when underloaded and therefore a phased usage of treatment capacity is required. In economic terms, it is usually the case that schemes are constructed in phases to reduce the initial capital cost in order to make schemes economically viable from the outset.

3.5 Archaeological Features

There are a number of archaeological and historical features both located in and surrounding the town of Ballylongford including Coolbeha House, Killelton Farm, Carraigafoyle Castle, Lislaughtin Abbey, Aghavallen Church and St. Michael's Church. An archaeological assessment of the village is included in Appendix 10.

3.6 Suitable Site Locations

The town was surveyed for suitable site locations, and suitable site locations were identified. The site of the existing holding tanks was deemed unsuitable due to its size and location (i.e. in a flood plain). The next site potentially earmarked for a treatment plant was to the west (Site A), however, the current population centroid is to the east.

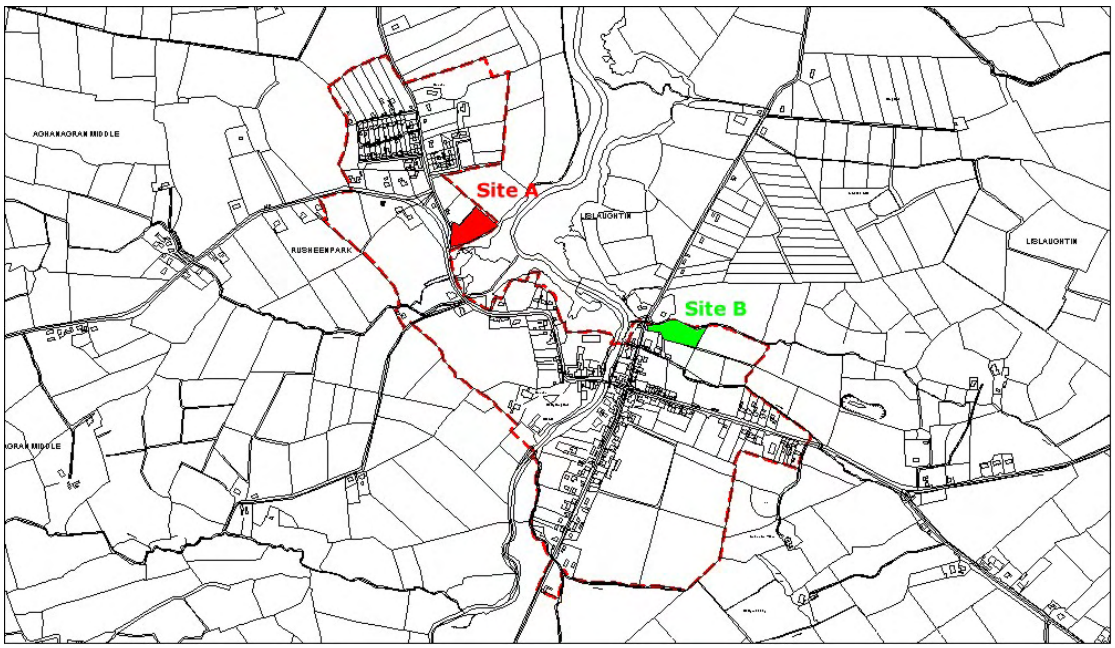

Figure 3.1 – WWTP Site Options

As a result, a site to the east was examined (Site B). This site is at a low point in the village. Regardless of the site chosen, pumping would have been required, and therefore, the choice of Site B requires lower pumping heads, and therefore a reduction in long term energy costs.

4.0 PROPOSED NETWORK

4.1 General

A foul sewer system is in existence, and extensions/upgrades to this are proposed in order to collect effluent from the existing dwellings which are served by individual treatment systems. Provision will be made for serving new houses currently under construction and houses where planning permissions have been granted. The foul sewer network, where possible, will provide for the capacity necessary to serve the future development areas within the existing Development Boundary.

The upgrades and repairs will also aim to reduce infiltration and repair slack gradients which can lead to excessive deposition and possibly blockage of the sewers, and subsequent public health and maintenance issues. Where possible and economical, storm water will also be removed from the combined system.

The existing wastewater collection network was discussed in Section 2 of this Report. The following work was undertaken in order to assess the performance of the existing networks and to identify required sewerage improvement works for this scheme;

- Manhole Location and Sewer Inspection Survey
- Hydraulic Model of the network

An assessment of the likely development areas has been made and future extensions to the sewerage network have been identified in order to serve these areas.

4.1.1 *Manhole Location & Sewer Inspection Survey*

The results of the sewer inspection survey were used to assign a service and structural grade of between 1 and 5, with 5 being the most critical, to each sewer surveyed. These grades are based on the recommendations contained in the 'Sewerage Rehabilitation Manual' published by the WRC.

The network was then assessed on the basis of the criticality of each sewer pipe. The criticality index was assigned on the basis of location, function and the consequence of failure. The factors used to determine the criticality index are detailed in Table 4.1 below.

Table 4.1 – Summary of Criticality Index Determination

Criticality Index / Factor	1	2	3
Location	- Local Road - Private Property - Farmland	- Country Road - Vicinity of SAC / SPA / NHA - Vicinity of school/hospital	- National Road - Within SAC/SPA/NHA - Adjacent to School/Hospital - Serving critical industry
Function	- Connection Sewer - 150 dia	- Branch/Collector - 225 dia	- Trunk Sewer - > 300 dia
Consequence of Failure	- Minor Local Flooding - < 10 houses	- Significant Flooding - > 10 Houses Affected - Local Road Closure	- Entire Network Failure - Treatment Works Failure - Major Road Closure - Business Access Affected - Damage to Property

The factor scores of each sewer line are averaged and rounded to the nearest integer to give a criticality index of between 1 and 3.

For example, if a 375 mm diameter sewer was located in a National Road, and the consequence of failure was that the entire network would fail, then the criticality index would be:-

Sum of Factor Scores: *(3+3+3) = 9*

Average of Factor Scores: *(3+3+3)/3 = 3*

Criticality Index: *3*

The criticality index is then compared to the structural and service grades of each pipeline. The matrix approach, shown in Tables 4.2, highlights the potential for service or structural failure of critical sewers and identifies the required remedial works.

Table 4.2 – Criticality Index against Structural / Service Grade

Criticality Index / Grade	1	2	3
5			
4			
3			
1 - 2			

	Structural	Service
	Sewer lengths requiring immediate replacement or re-laying works.	Sewer lengths requiring immediate maintenance and re-lining works.
	Sewer lengths requiring programmed replacement or re-laying works.	Sewer lengths requiring immediate maintenance works.
	Sewer lengths requiring programmed maintenance and monitoring.	Sewer lengths requiring regular programmed sewer cleaning.

The criticality index has been calculated for each pipeline surveyed in Ballylongford and the matrix approach, described above, has been used to highlight the potential for service or structural failure of critical sewers and to identify the required remedial works.

The remedial works identified are shown in Drawing Nos. 20367-BD-07 and are detailed below in Tables 4.3 and 4.4.

The manhole location and sewer inspection survey has also identified:

- Pipelines partially blocked by siltation, debris and grease.
- Manholes in need of improvement works.

It is recommended that the required pipeline cleaning and manhole improvement works should be included in the Phase I rehabilitation of the networks in Ballylongford to maintain the asset and improve the performance of the network.

Table 4.3 – Service Rehabilitation Works in Ballylongford

US Node	Service Grade	Criticality Index	System Type	Pipe Size (mm)	Pipe Length (m)	Comment	Recommended Action
EF 52 (9001)	4	2	Foul	300	54	Debris	Pipe cleaning
EF 6 (6004)	4	3	Foul	300	15	Encrustation	Pipe cleaning and local repair
EF 63.1 (8506)	4	2	Foul	225	63	Debris, connection intruding	Pipe cleaning and local repair
EF 60 (8606)	4	2	Foul	225	63.07	Debris, encrustation, connection intruding	Pipe cleaning and local repair
EF 54.1.4 (1701)	4	2	Foul	225	70	Debris, encrustation	Pipe cleaning
EF 54.1.2 (0802)	4	2	Foul	225	61	Debris, encrustation	Pipe cleaning and local repair
EF 6.1 (7001)	4	2	Foul	225	75	Debris, silt, encrustation, connection intruding	Pipe cleaning and local repair
EF 8 (5001)	4	2	Foul	225	119	Debris	Pipe cleaning
EF 10 (4101)	4	2	Foul	225	46	Debris	Pipe cleaning
EF 14 (4303)	4	2	Foul	225	64	Encrustation	Pipe cleaning and local repair
EF 15 (4401)	4	2	Foul	225	74	Encrustation, connection intruding	Pipe cleaning, and local repair
EF 20 (3501)	4	2	Foul	150	48	Roots, connection intruding, obstruction	Pipe cleaning and local repair

Table 4.4 – Structural Rehabilitation Works in Ballylongford

US Node	Struct-ural Grade	Criticality Index	System Type	Pipe Size (mm)	Pipe Length (m)	Comment	Recommended Action
EF 57 (9708)	5	2	Foul	225	62	Cracks, hole	Cleaning and partial re-lining
EF 51 (9701)	5	2	Foul	225	69	Hole	Cleaning and partial re-lining
EF 20 (3501)	4	2	Foul	150	48	Cracks, fractures, joint displacement, infiltration at joint	Cleaning and re-lining
EF 19 (3502)	5	2	Foul	150	36	Fractures, deformation, joint displacement, infiltration	Cleaning and re-lining
EF 18 (3404)	4	2	Foul	150	20	Fracture, hole	Cleaning and partial re-lining
EF 17 (3401)	4	2	Foul	150	30	Open joint, cracks, fractures, infiltration, joint displacement	Cleaning and partial re-lining
EF 15.1 (4406)	5	2	Foul	150	18	Deformation	Partial re-lining

4.1.2 *Hydraulic Model*

The hydraulic model for Ballylongford has been constructed as Type II model in accordance with the *"Code of Practice for the Hydraulic Modelling of Sewer Systems"* published by WaPUG. The purpose of such model is primarily as a planning tool to:

- identify hydraulic problems within a drainage area
- identify the need for possible hydraulic upgrade scheme
- assess the impact of proposed developments

The data used to construct the models was obtained from:

- Kerry County Council.
- Manhole Location & Sewer Inspection Survey.
- Short Term Flow & Rainfall Survey.
- Met Eireann

The majority of the data used in model construction was classified as Level A or otherwise known as maximum accuracy data. As a result of the good data

quality, only a minor degree of interpolation and assumption was required where access was not available to survey parts of the network.

The hydraulic model for Ballylongford has been verified using the data of a short term flow and rainfall survey. Verification is the process of checking a model against independent data to determine its accuracy. The verification events were chosen to comply with the WRc publication *"A Guide to Short Term Flow Surveys of Sewer Systems"*. The model was verified in accordance with the *'Code of Practice for the Hydraulic Modelling of Sewer Systems'* and User Note No. 33 *'Modelling Dry Weather Flow'* published by the Wastewater Planning Users Group (WaPUG) in the following sequence:

- Dry weather flow verification with flow survey data
- Verification with storm events from flow survey data

The resultant dry weather flow verification was the best that could be achieved with the low flow data measured during dry weather periods. However, the correlation achieved between the observed and simulated storm flows in each catchment are within the guideline values published by WaPUG for all storm event in both flow monitor locations. This level of verification is good considering the depth recorded by the flow monitors were mostly below the measurable limit and the catchment model is considered to be verified for storm flows.

The hydraulic model was used to identify and resolve hydraulic deficiencies in the existing sewerage network. The model predicts that flooding is less likely to occur within the existing foul network when the tide levels are low. Surcharging however is probable to occur for storm events with 1 and 2 year return periods due to pipes laid at flat gradients. The model shows that flooding may occur for storm duration with a 5 year return period at node EF 54 (9805) (main crossroad in town) if the tidal level exceeds 2.16 metres above Malin Head ordinance datum. Details of the existing pumping station off Ballybunion Road including pump switch on and switch off levels as well as discharge rate have been assumed as part of the above model simulation.

4.2 Proposed Foul Network

The design of sewer extensions to serve areas of future development was made using the following design criteria:

- The trunk sewer network shall be designed to carry flows up to 6 times the dry weather flow. Provision shall be made at the WWTP and pump station for handling of peak flows.

- All future developments shall be constructed with separate foul and surface water drainage systems.

The proposed extensions are illustrated on Figure 4.1 and shown on Drawing No. 20367-BD-07. The proposed works will cater for the immediate needs of the village as well as provide the capacity to cope with future development. Pipelines required to serve private lands have not been shown, as their routes will be decided by developers, but have been taken into account in the analysis of the network, so that any area of can be connected to the network, without negatively affecting the performance of the network. This has been done by examining the least favourable connection point for each parcel of land, allowing a confidence that any other connection point for a parcel of land will lead to more favourable conditions.

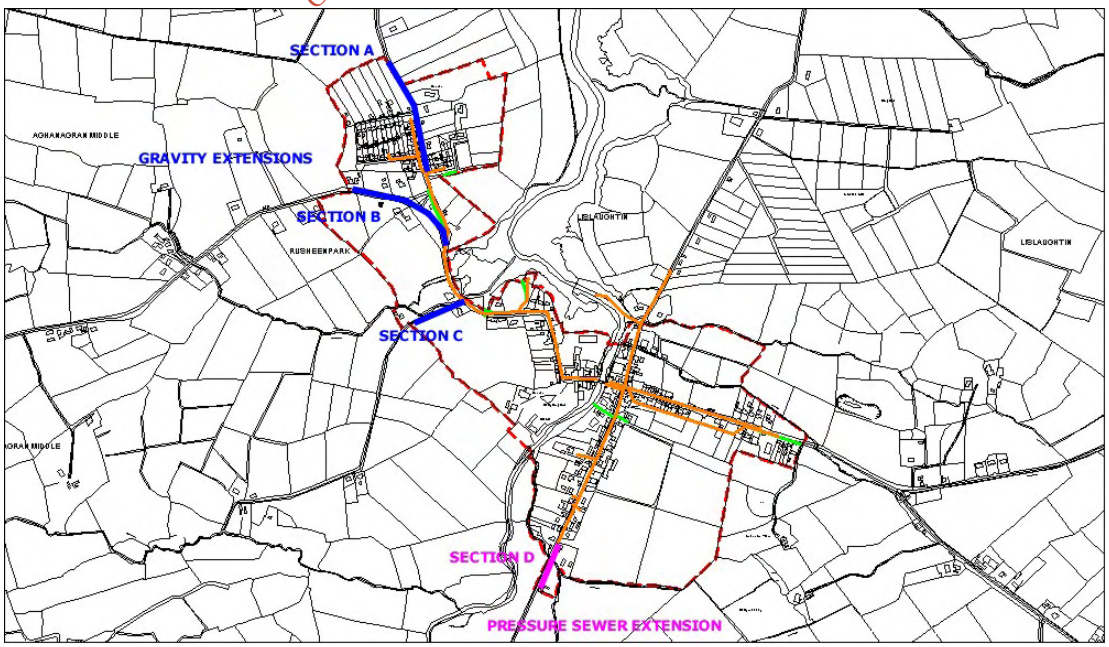

Figure 4.1 – Proposed Network Extensions

4.2.1 Ballylongford Extensions and Upgrades

Sewer Upsizing – Existing Network

The upsizing of 150 mm pipes to 225 mm pipes are proposed between manholes EF 65 (7402) to EF 61 (8503). It is also recommended that the 300 mm pipelines between manholes EF 54 (9805) and EF 53 (9001) is increased to 375 mm to cope with future development at the same time improve hydraulic deficiencies which may arise for storm events with return periods over 5 years. This is shown on Drawing No. 20367-BD-07.

Section A – Sewer Extension

227 metres of 225 mm gravity sewer laid at available gradient will have the capacity to cater for future population at the zoned areas northwest of Ballylongford village. The proposed sewer extension would connect to the existing system at manhole EF 15 (4401). This is shown on Drawing No. 20367-BD-07.

Section B – Sewer Extension

225 mm sewer laid at available gradient will have the capacity to serve the future population of Rusheen Park area. The length of the extension is 340 metres and would join the existing network at node EF 11 (4201). This is shown on Drawing No. 20367-BD-07.

Section C – Sewer Extension

New developments in Arghangran Middle area would be served by a 225 mm diameter sewer extension. The 160 metres long sewer pipeline would connect to the existing system between manholes EF 9 (4102) and EF 8 (5001). This is shown on Drawing No. 20367-BD-07.

Section D – Sewer Extension

It is not possible to transfer flows from the south zoned areas of Ballylongford to the existing network by gravity pipeline due to topographic constraints along the route. The existing 5 houses in that area would transfer flows to manhole EF 65 (7402) with the help of individual package pumping stations via a small bore pressure sewer. This has proved to be the most economical method of serving this area. This involves the use of macerating pumps and small bore pipelines.

Further to the proposed works mentioned, a new pumping station is required to divert discharges from the western half of the network to the eastern network. The diversion would eliminate tidal interferences experienced at the western sewer network. The pump is sized to serve half the projected ultimate population of 1,584. The pumps are sized to transfer flows as much as 12 l/s to for cater 6 times the dry weather flow to the eastern network. The optimum rising main diameter was determined to be 150 mm diameter to cater for future development over the life span of this report and would connect the proposed pumping station off Ballybunion Road and manhole EF 54.2.2 (9802). A storm water tank is required within the site to accommodate surface runoff from the existing buildings during heavy rainfall events and prevent oversizing of the pump station/rising main system and the overloading of the eastern network. The storm tank was sized to cater for storm events with a 5 year return period.

A pumping station will also be required on the eastern catchment to transfer flows to the WWTW. This second pumping station will ensure that the tidal influence on the network is complete eliminated. This is shown on Drawing No. 20367-BD-07.

Environmental Issues

There are several houses along the Ballyline River, near the bridge on the eastern bank which discharge raw sewage into the river. In order to terminate these discharge, either an interceptor sewer or individual small pump sumps would be required. Due to the difficulties in installing an interceptor sewer along the wall of the river, an allowance has been made to install a package pump sump with macerating pump in each of these premises to pump the sewage up to the main road and the trunk sewer between manholes EF 56 (9701) and EF 55 (9806) on Drawing No. 20367-BD-07.

4.3 Proposed Storm Network

A storm water network has been designed for Ballylongford using the design principles detailed in Appendix 3. The proposed storm network layout and long sections for are detailed in Drawing Nos. 20367-LW-08 and 20367-LW-14.

Overall the topography in Ballylongford consists of several steep gradients falling towards the town centre. The proposed pipelines discharge at four locations,

namely at two points on the Ballyline River and at two points on the stream flowing in from west of the town. The diameter of the proposed stormwater pipelines are between 300mm and 400mm would have sufficient capacity to cope with surface runoff from future developments. Details of the surface water network calculations are given in Appendix 3.

The estimated cost for the proposed stormwater network is €535,923. The detailed breakdown is included in Appendix 5 of the report.

It is inevitable that a certain amount of surface water will enter the foul network system, particularly from roofs and yards already connected to the system. Soak pits should be installed by householders to ensure minimum inflow of storm water into the foul network and this can be addressed at construction stage through public awareness training combined with detailed property surveys and potentially funding or other incentives for remedial works.

Any substantial development should have its own surface water drainage system, design on the principles of SUDS, which can then connect to the proposed storm water network. This is primarily as a method of preventing pollution but also due to flooding and watercourse issues.

5.0 PROPOSED TREATMENT

5.1 General

The primary purpose of a sewerage scheme is to maintain public health by preventing direct human contact with wastewater. Current legislation and ever increasing pressure on the environment, requires that this must be done in an environmentally sensitive fashion.

The ultimate goal of the treatment plant is to discharge an effluent which has as low an environmental impact as is reasonably possible and which complies with all legislative requirements.

In terms of design, a treatment plant must have the capacity to deal with both the anticipated hydraulic and organic loads over the lifetime of the treatment plant. The hydraulic load will determine the physical size of units and pipework within the plant. The organic load can then be treated by appropriate physical and/or biological processes.

In addition to the organic load, wastewater generally also contains non-biodegradable material, such as grit/plastics/rags, which can be removed by physical processes. This non-biodegradable load is becoming increasingly important as the general population becomes more and more removed from wastewater treatment, and bares little responsibility for what can end up in the sewer. Non-biodegradable items commonly disposed of in domestic toilets can be a cause of visible litter, and are often the first visible sign of an untreated effluent reaching a receiving water.

The liquid treatment stage may incorporate some or all of the following stages of treatment:

- preliminary treatment
- primary treatment
- secondary treatment
- tertiary treatment

A preliminary treatment stage is invariably included in municipal treatment systems, typically incorporating screening and grit separation. It generates two

categories of waste solids, screenings and grit. Primary treatment involves the removal of suspended particulate matter from the wastewater by sedimentation or flotation processes. It generates clarified effluent and primary sludge streams.

Secondary treatment involves the removal of suspended and colloidal particulate matter in addition to dissolved organic matter, using biological, physicochemical or membrane processes. Biological processes are invariably used in municipal wastewater treatment systems, where secondary treatment is required. Secondary treatment generates a clarified liquid effluent and a sludge residue.

Tertiary or advanced treatment is included in municipal wastewater treatment streams where low residual effluent nitrogen and phosphorus levels are required or where the residual suspended solids or BOD_5 must be reduced to a very low level. Advanced nitrogen removal is typically achieved by biological processes: advanced phosphorus removal may be achieved by biological and/or chemical precipitation processes; filtration processes are applied to achieve an advanced level of suspended solids removal. The solids streams may include screenings, grit, primary sludge and a variety of biosludges.

Attached growth filters include: sand, peat and textile filters; trickling filters and rotating biological contactors; and subsurface flow wetlands. Attached growth technologies work on the principle that organic matter is removed from wastewater by microorganisms. These microorganisms are primarily aerobic, although there is generally a mixture of aerobic and anaerobic bacteria. The bacteria grow on the filter media (materials such as gravel, sand, peat, or specially woven fabric or plastic), essentially recycling the dissolved organic material into a film that develops on the media. In all cases, attached growth filters act as secondary treatment devices following a septic tank or other primary treatment. Raw wastewater must be treated first to remove the larger solids and floating debris, because these solids can plug the filter media. There are two basic designs of attached growth or fixed film systems: those that hold the media in place, allowing the wastewater to flow over the bed (such as trickling filters), or those where the media is in motion relative to the wastewater (e.g. rotating biological disks). In most cases, drains under the media collect the effluent and either send it back through the filter or send it on for further treatment.

The main advantages of attached growth processes over the activated sludge process are lower energy requirements, simpler operation, no bulking problems, less maintenance, and better recovery from shock loads.

Trickling Filters

Trickling filters are the oldest attached growth process, and have been used for nearly 100 years to provide low-cost, low maintenance, biological wastewater treatment. Trickling filters offer simple, reliable treatment in areas where large tracts of land are not available. Because of their high design flexibility, trickling filters are able to handle a wide variability of wastewater strengths. But, these types of filters generate sludge, which must be treated and disposed of, although the quantities are generally less than activated sludge as the BOD removal process is essentially a respiration process. Trickling filters also require regular attention from an operator.

The most common design is the non submerged trickling filter. The wastewater is applied to the surface of the filter (a bed of rocks, gravel or plastic). The wastewater percolates down through the bed to a drain where it collects and discharges, or sent for further cleaning. The composition, size, uniformity and depth of the media all affect performance.

A jelly-like biological film forms on the gravel or plastic where the bacteria break down the organic matter. The film becomes very thick and eventually falls off of the supporting surface, and a new slime layer begins to grow in its place. This 'sloughing' should be a continuous process if the system is managed properly. Without the sloughing action, the media will clog and develop entirely anaerobic conditions. The collected liquid is passed to a sedimentation tank where the solids are separated from the treated wastewater. The bacteria clumps that drop off must be treated as suspended solids. Plastic media allows high loading rates and taller filters that use less land area.

Rotating Biological Contactors (RBCs)

Rotating biological contactors (RBCS) were first used in Germany in the 1960s, and have proven effectiveness at treating wastewater. An RBC consists of a series of closely spaced, circular, plastic disks mounted on a shaft. The disks are partially submerged in wastewater and slowly rotate through it. The surface of

the disks provides an attachment site for the aerobic bacteria. Oxygen is provided as the disks move in and out of the water. Solids are kept in suspension by the mixing action of the rotating media. Excess slime on the disks sloughs off from time to time, just as in the trickling filter systems. The disks are most commonly made of high-density polyethylene or Styrofoam and are usually ridged, corrugated, or lattice-like to increase the available surface area. These systems must be designed carefully to avoid excessive biofilm growth and sloughing problems, which may lead to failure of mechanical parts in the treatment unit. RBCs can be arranged in a variety of ways depending on specific effluent characteristics and the secondary clarifier design and can be designed specifically for BOD removal or nitrification. RBCs are often covered with a fibreglass housing to protect the disks from deterioration due to ultraviolet light, to protect the process from low temperatures, and to control the buildup of algae. Performance of this type of treatment design drops considerably at air temperatures below 12.8ºC.

Sand and Peat Filters

Treatment filters using sand or peat as media make effective attached growth systems. They can be designed as either single-pass or recirculating filters, meaning that the wastewater is run across the media more than one time. Regardless of the media, the process is generally the same–wastewater from the septic tank is allowed to run through a bed of media and collected from underneath. Treatment occurs as the bacteria grows on the media.

Sand Filters

Sand filters are constructed beds of sand or other suitable granular material usually about 1 meter. The media is usually contained in a liner made of concrete, plastic, or other impermeable material.

Subsurface Flow

Constructed wetlands consist of one or more rectangular treatment basins, called cells, filled with gravel, soil and/or plants that provide the filtering effect. Wetland systems are commonly designed with multiple cells operated in parallel to allow the system to be alternated and rested during maintenance. The bottoms of subsurface flow cells may be slightly sloped (up to 0.5 percent) to encourage the flow of wastewater through the system, and a natural clay or synthetic liner may be necessary for certain sites with high groundwater or soil restrictions.

Subsurface flow wetlands are natural systems that don't require energy to perform treatment. Most subsurface flow wetlands are designed so that wastewater travels through the length of the cell one time to receive treatment. Typical wastewater retention times range from two to six days. Each cell is filled with rock or gravel placed on top of the soil or a lining on the cell bottom. The depth of the media is usually 30 to 60 cm. Water-loving plants are rooted in the gravel. In properly working systems, the wastewater flows just below the surface of the gravel and remains unexposed to the atmosphere. Although the media is saturated, the wetland plants' roots provide oxygen to create conditions conducive to treatment. Cattails, bulrushes, and reeds are able to grow extensive roots and improve the treatment effectiveness by providing additional surfaces where bacteria can reside and where waste materials can be trapped. Plants also take up and store some of the metals and other pollutants in the wastewater. Properly designed, operated, and maintained constructed wetlands can effectively reduce BOD, suspended solids, nitrogen, metals, and other pollutants. However, phosphorus removal is minimal. Depending on the level of treatment and local requirements, effluent from constructed wetlands may be disinfected, discharged directly into the environment, or directed to a soil absorption field for further treatment.

5.1.1 Key Effluent Wastewater Parameters

Wastewater is generated as a result of human activity and excreta, and consists of about 99% water and 1% solids. The water carries particulate matter, but also contains dissolved organic and inorganic substances. The primary wastewater constituents of environmental concern are Biochemical Oxygen Demand (BOD), Phosphorus (P) and Nitrogen (N), in various forms. The various parameters are explained below for completeness.

Biochemical Oxygen Demand (BOD)

BOD is a measure of the amount of oxygen utilised by micro organisms to stabilise an organic waste. The BOD_5 is a relatively crude test, but gives a good measure of the likely environmental effect of the organic matter in a sample. The BOD_5 test is used extensively as a measure of wastewater strength, effluent quality and river water quality. As the saturation solubility of oxygen in water is about 10mg/l, under certain circumstances the BOD of a wastewater mixed with a receiving water can reduce the level of oxygen in the river to the point where fish-kills or other environmental damage due to lack of oxygen can occur.

Chemical Oxygen Demand (COD)

COD is a measure of the amount of oxygen chemically required to stabilise an organic waste. The COD is a quick and precise test, but gives an overestimation of the likely environmental effect of the organic matter in a sample, as it includes oxidation of organic material which may be biologically inert. As such the test is most useful when a correlation between BOD and COD has been established for a particular wastewater.

Phosphorus

Phosphorus can have a negative effect on a receiving water if the natural levels are exceeded. This is because Phosphorus is a limiting nutrient required for biological cell growth, and is usually in limited supply in fresh waters under natural conditions. Its lack of availability limits the amount of cell growth which can occur. If cell growth is not limited, Eutrophication can arise. Eutrophication is the process whereby excessive growth of algae or other plants occurs, followed by the subsequent utilisation of all oxygen in the water when decomposition of this excessive growth occurs.

Phosphorus is usually the limiting nutrient in freshwater, whereas Nitrogen is usually the limiting nutrient in the marine environment. The Phosphorus Regulations recommend very low concentration for MRP in rivers. The effluent discharge in this case is to an estuary however, and Nitrogen is usually taken as the limiting nutrient in the marine environment.

Nitrogen

Nitrogen occurs naturally in many forms, but essentially can cause an environmental problem in two forms, Ammonia (NH) and Nitrate (NO_3). Un-ionised ammonia (NH_3) in small concentrations can cause gill damage to fish, and can also lead to fatalities in the case of prolonged exposure. Nitrate while it is not particularly damaging to fish per say, has a maximum level permitted in drinking water for human consumption. Nitrogen, as mentioned earlier, can be a contributing factor in Eutrophication, usually in the marine environment.

Suspended Solids

Aside from grit and other non biodegradable items, wastewater typically contains about 1% solids. There are many different ways of fractionising the solids in wastewater, however the Total Suspended Solids (TSS) is a measurement

commonly used by the EPA and in the related legislation. Of the key parameters TSS is typically the least critical, but can have a BOD associated with it, and is therefore of concern.

5.2 Wastewater Treatment Load

The proposed design p.e. for Ballylongford in 2026 has been estimated to be 1,200 p.e. as determined by the population projections in Appendix 1 of this report.

The basic design parameters for the wastewater treatment plant are therefore summarised as follows:

Table 5.1 – Ballylongford Influent Load

Parameter	Medium Growth	High Growth
Population Equivalent	1,200	1,600
Dry Weather flow (l/s)	3.13	4.17
Average BOD (kg/day)	72.00	96.00
Total Phosphorus (kg/day)	2.16	2.88
Total Nitrogen (kg/day)	13.20	17.60
Suspended Solids (kg/day)	91.00	112.00

5.3 Discharge Standards

The primary objective in setting an effluent quality standard for Ballylongford is to ensure that the effluent quality complies with all current statutory regulations applying to effluent discharges as well as complying with best engineering and environmental practice. The relevant regulatory guidelines in this case are found in the following documents:

- Urban Wastewater Treatment Regulations, 2001 (S.I. No. 254 of 2001). Revoking the EPA Act 1992, giving further effect to the Council Directive 91/271/EEC as amended by Council Directive 98/15/EC.

- Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998. S.I. No. 258 of 1998.

- European Communities (Quality of Salmonid Waters) Regulations, S.I. 293/88.

- Shannon Estuary Water Quality Management Plan (WQMP).

5.3.1 *Urban Wastewater Treatment Regulations*

The minimum treatment standards required at the WwTPs as set down in the Urban Wastewater Treatment Regulations (UWTR) are as follows:

"A Sanitary Authority should ensure by the 31st December 2005 that urban wastewater entering a collection system shall before discharge be subject to **appropriate treatment** in respect of discharges to freshwater from agglomerations with a population equivalent of less than 2,000".

"A Sanitary Authority should ensure by the 31st December 2005 that urban wastewater entering a collection system shall before discharge be subject to **appropriate treatment** in respect of discharges to coastal waters from agglomerations with a population equivalent of less than 10,000".

Where "appropriate treatment" is defined as "treatment of urban waste water by any process and or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and the relevant provisions of the directive and of other community directives".

As the population of Ballylongford is less than 2,000 p.e. and is likely to remain so, wastewater collected at Ballylongford should be subject to "**appropriate treatment**".

The receiving water at Ballylongford is an estuary, and therefore a mix of fresh and sea water, however, for the purposes of this report, the receiving will be assumed to a fresh water, which is a conservative approach and particularly appropriate given the environmental designations of the area.

5.3.2 *Phosphorus Regulations*

The Phosphorus loads permitted in a river are governed by the Phosphorus Regulations (S.I. 258 of 1998). The salient features of these regulations are summarised below:

a) The standards quoted are in terms of Molybdate – Reactive Phosphate.

b) The concentrations measured are median values determined using a minimum of 10 samples taken at intervals of four weeks or longer in any 12 consecutive month period.

c) The existing biological quality rating / Q index is to be improved to meet the minimum target biological quality rating / Q index as detailed in the Regulations.

The Phosphorus Regulations however only apply to freshwaters such as rivers and lake and do not apply to estuarine waters. However, for the sake of completeness, the assimilative capacity in relation to Phosphorus will be examined.

5.3.3 *Shannon Estuary Water Quality Management Plan*

The principal beneficial uses identified in the WQMP which require water of a certain quality are:

- Fisheries
- Recreation and Amenity
- Fauna

Where a variety of beneficial uses must be catered for, those uses requiring the highest quality of water determine the criteria and standards which must be set. Salmonid fish are particularly sensitive to water quality and adequate water quality to allow passage of these fish is considered to be the most significant threshold.

As many of the smaller tributaries of the Shannon Estuary support salmon fish stocks, the WQMP proposes that water quality parameters necessary for the passage of these species should apply over the full extent of the Shannon Estuary.

5.3.4 *Quality of Salmonid Waters*

The Aghanagran and Ballyline rivers nor Ballylongford Bay have been included in Schedule 1 of the European Communities (Quality of Salmonid Waters) Regulations, S.I. 293/88 and are therefore not designated as a salmonid waters.

However as the WQMP sets a target to allow passage of these fish the standards of this legislation are quoted for reference. This Statutory Instrument gives effect in Ireland to EU Directive 78/659/EEC, which governs the quality of fresh water needing protection or improvement in order to support fish life. The water quality requirements of S.I. 293/88 are given below:

Table 5.3 – European Communities (Quality of Salmonid Waters) Regulations, S.I. 293/88

Parameter	Value	Unit
Dissolved Oxygen	50% $\geq$ 9	mg/l O_2
pH	$\geq$ 6 $\leq$ 9	
Total Suspended Solids	$\leq$ 25	mg/l
BOD_5	$\leq$ 5	mg/l O_2
Nitrite	$\leq$ 0.05	mg/l NO_2
Un-Ionised Ammonia	$\leq$ 0.02	mg/l NH_3
Total Ammonia	$\leq$ 1	mg/l NH_4^+

5.4 Waste Assimilative Capacity of Receiving Waters

5.4.1 *Calculation*

The requirements of the Urban Wastewater Treatment Regulations are for appropriate treatment, to allow the receiving waters to meet the relevant quality objectives. Therefore effluent quality requirements are dependant on the background concentrations and the 95 percentile flow in the river (i.e. assimilative capacity) and calculated in accordance with the requirements of the Salmonid Water Regulations. Although the receiving water is estuarine, the calculations presented below are based on discharge to the Ballyline River, which is a conservative approach.

By concentration mass balance, the allowable effluent concentration is:

$$C_e = \frac{C_{dn}(Q_e + Q_r) - Q_r C_r}{Q_e}$$

Where: C_e = allowable effluent concentration (mg/l)

Q_e = effluent flow (m^3/s)

C_r = upstream background concentration (mg/l)

Q_r = upstream 95%ile river flow (m^3/s)

C_{dn} = allowable downstream concentration (mg/l)

BOD

For BOD the downstream maximum concentration is taken as 4 mg BOD/l even though this is more stringent than the Salmonid regulations it is considered necessary, due to the criticality of oxygen concentration in rivers for the survival of aquatic life, that there is a factor of safety associated with this parameter.

Phosphorus

The regulations state that the existing biological quality rating assigned between 1st January 1995 and 31st December 1997, or, "where monitoring was not carried out during that period, the biological quality rating first assigned by the Agency (the EPA) to that part based on monitoring carried out after 1997" is the rating upon which the improvements in Water Quality will be judged.

As the regulations determine the Q index using the median of 10 samples over 12 months (taken at intervals of 4 weeks or longer), the enforcement of the MRP load determined from 95%ile flows is extremely onerous. The more realistic load is given by using the average flow in the river as this is more representative of the variable flows to be encountered during the 12 month sampling period. Therefore the Waste Assimilative Capacity calculation is used with average flow to calculate the allowable increase in MRP load.

Total Oxidised Nitrogen

The ultimate population of Ballylongford is less than 10,000 so as a result no Total Nitrogen (and thus no Total Oxidised Nitrogen) standard applies under the Urban Wastewater Treatment Regulations.

Total Ammonia

The effluent total ammonia concentration permitted is calculated using the maximum permitted downstream concentration of 1 mg/l taken from the Salmonid regulations. This is done to protect against un-ionised ammonia (a tiny fraction of the total ammonia concentration under normal conditions in Irish rivers) which, in concentrations greater than 0.02 mg/l, can cause gill damage to fish.

5.4.2 *Aspects of River Catchment Hydrology*

The nearest hydrometric station to Ballylongford is at Inch Bridge (Grid Reference N 957 362) for the Galey River catchment. This station is located approximately 10 km south west of Ballylongford village. This station has been in operation since 1949. The reported catchment characteristics at Inch Bridge based on the period of continuous hard copy records that has been evaluated (1949-2006) and published by the OPW are given below:

Catchment Area	196 km^2
95 Percentile Flow	0.22 m^3/sec
Average Annual Flow	4.717 m^3/sec

The Catchment Area at the discharge location for Ballylongford has been estimated to be 20 km^2. Extrapolating from the catchment characteristics for the Galey River the calculated catchment characteristics for the tributary at the discharge location are given below:

Catchment Area	20 km^2
95 Percentile Flow	0.0224 m^3/sec
Average Flow	0.4813 m^3/sec

5.4.3 *Water Quality*

Relevant Water Quality Data for the Ballyline River is given in Table 5.4 below. The nearest upstream station to Ballylongford is at Gortnacooka Bridge (Station No. 0700) and there is no downstream station rated in the EPA data.

Table 5.4 – Water Quality (Q) Data (EPA) for the Ballyline River 1988 -2002

Year	Biological Quality Rating Q Value				
	1988	1994	1996	1999	2002
Upstream	3	3	3	3	3-4
Downstream	-	-	-	-	-

The Ballyline river upstream of Ballylongford is currently classified as being moderately polluted.

Table 5.5 – Actual Chemical Analysis (EPA) 2001 - 2003 for Ballyline River

Parameter	Dissolved Oxygen (% Saturation)			BOD ($mg/l\ O_2$)		
Station	Min.	Med.	Max.	Min.	Med.	Max.
Upstream	79	98	105	1.6	2.3	4.6
Downstream	-	-	-	-	-	-

Parameter	Total Ammonia (mg/l N)			Ortho-Phosphate ($mg/l\ O_2$)		
Station	Min.	Med.	Max.	Min.	Med.	Max.
Upstream	0.02	0.09	0.23	**0.05**	**0.1**	**0.25**
Downstream	-	-	-	-	-	-

The EPA's assessment of the Ballyline River was that it satisfactory at just one of the three sampling locations with moderate and slight pollution, due to suspected agricultural sources, at the other two locations.

5.4.4 *Waste Assimilative Capacity*

BOD

From analysis of the sampling results presented in the table above the upstream value for BOD is taken as 2.3 mg/l. The resultant WAC calc gives an allowable effluent concentration of approx 16.21 mg/l.

Phosphorus

The Q index upstream of the discharge location was determined as Q3 in 1996 and downstream was unrated. The minimum target ratings and concentrations for these stretches of water as defined in the Phosphorus Regulations are given in Table 5.6 below:

Table 5.6 –Phosphorus Regulations Target Ratings and Concentrations

	1996 Biological Quality (Q) Rating/Q Index	Minimum Target Biological Quality (Q) Rating /Q Index	Molybdate Reactive Phosphate Median Concentration (µg MRP/L)
Upstream	3	3-4	40
Downstream	unrated	unrated	unrated

The upstream water quality must improve to a Q3-4 rating (i.e. 45 μg MRP/L). The downstream water quality is unrated so an assumption has to be made to the water quality rating. Allowing a downstream value of 50 μg MRP/L, the allowable increase in the receiving water is taken as 5 μg MRP/L.

Using the WAC Calculation and Average Flow, this gives an allowable effluent concentration of 1.26 mg/l.

Total Ammonia

From analysis of the sampling results presented the background value for Total Ammonia is taken as 0.09 mg/l. The resultant WAC calculation gives an effluent concentration of approx 7.54 mg/l.

Table 5.7 –Allowable Effluent Concentrations to Ballyline River

Parameter	Allowable Effluent Concentrations (mg/l)
BOD	16.21
Phosphorus	1.26
Ammonia	7.54

5.5 Discharge Specification

BOD

Due to the relatively low waste assimilative capacity of the stream, an effluent BOD standard of 15.0 mg/l would be required of discharging directly to the stream, however, it is proposed to discharge through the existing outfall, at high tide only, so that the dilutions available would allow many multiples of this figure. As such, a standard of 25mg/l is proposed.

Phosphorus

An effluent standard of 1.0 mg/l would be required for MRP as a result of the low waste assimilative capacity of the Ballyline River, however, given the proposed discharge method, and the fact that the receiving water is estuarine, no Phosphorus standard is proposed.

Total Ammonia

An effluent standard of 5.0 mg/l would be required for ammonia as a result of the low waste assimilative capacity of the river, however, given the proposed discharge method, and the fact that the receiving water is estuarine, no Ammonia standard is proposed.

As the discharge location is to an estuary, significant dilutions will be available as the tide rises. Therefore the use of a tidal tank to control the discharge will negate the need for the tertiary standard and/or nutrient limits thus compliance with the UWWTR only is proposed.

Table 5.7 – Discharge Specification

Parameter	Discharge Specification * (mg/l)
BOD	25 mg/l
Suspended Solids	35 mg/l
COD	125 mg/l

*** Note** Nutrient limits are not proposed.

5.5.1 *Required Treatment*

The wastewater collected at Ballylongford consists of primarily domestic wastewater, which will need screening and treatment. It is proposed to treat the wastewater at Ballylongford using a CAST system (Compartmentalised Aerated Septic Tank) followed by a package plant to remove further BOD and ammonia. The effluent will then be stored in a tidal tank for release at the appropriate tidal cycle to ensure maximum dilution of the effluent. The proposed treatment plant is shown on Drawing No. 20367-BD-9 and illustrated in Figure 5.1.

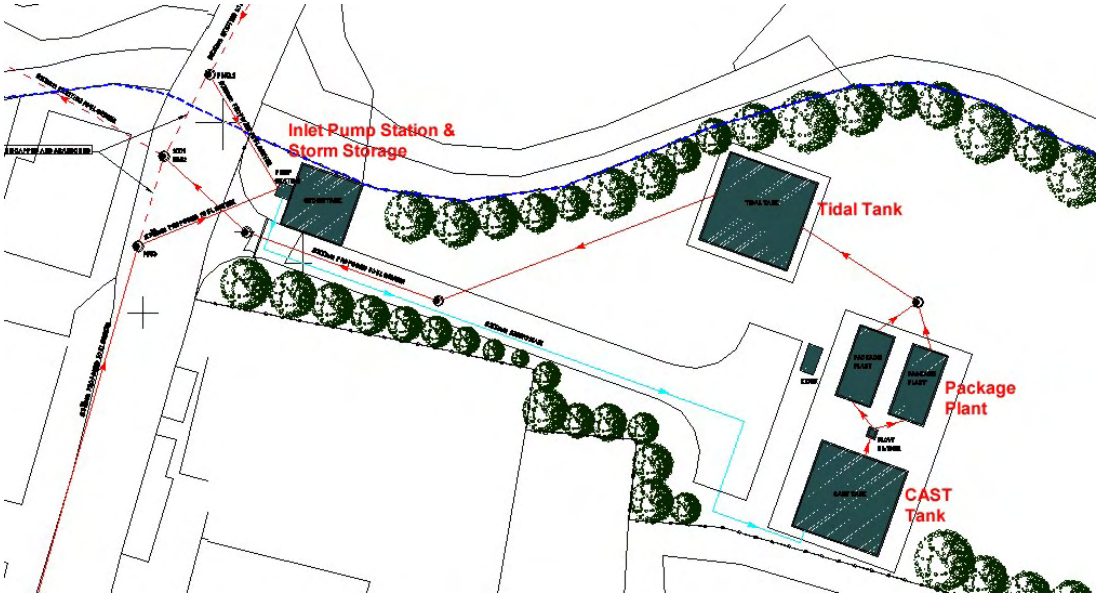

Figure 5.1 – Proposed WwTP Layout

This treatment is based on the use of appropriate treatment to the location, in accordance with the Environmental requirements. Section 5.4 details the Waste Assimilative Capacity (WAC) at the discharge location. The WAC for the river would indicate an onerous effluent standard. However the use of a tidal tank ensures discharge at high tide. The assimilative capacity in this scenario is large and indicates that minimal removal of pollutants is required on environmental grounds, however, given the environmental designations, it is felt prudent to minimise the impact of the wastewater on the environment.

The CAST / Package Plant / Tidal Tank system will provide compliance with the Urban Wastewater Treatment Regulations. Should the high growth scenario be reached, then Phase II can be constructed, which would be a further package plant to serve the larger population. The CAST tank would have the capacity to cater for this Phase II load.

Septic tanks are an effective means of treating domestic wastewater, working on the principle of fermentation and anaerobic digestion. Septic tanks have been used as a means of treating wastewater for many generations, however have fallen into disfavour in recent years primarily due to the resultant diffuse pollution of inland waters.

The general principle of the septic tank is settlement of particulate material, which can subsequently bio-degrade. The resultant effluent from a septic tank

has much reduced levels of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Total Suspended Solids (SS). Due to the arrangement of pipework within a septic tank, septic tanks also capture oil, fats and grease and non-biodegradable materials such as grit/plastics/rags, and therefore provide a comprehensive form of wastewater treatment with no energy costs.

The main cause of failure of septic tanks is the blockage of the percolation area due to small amounts of particulate matter or rags passing through the system, eventually clogging the distribution system to the percolation area over time. Recent years have seen the successful introduction of mechanical filters to the effluent pipe of septic tanks, which has effectively solved the issue of blockage of the distribution system. These filters need cleaning on a scheduled basis.

Septic tanks accumulate a sludge, which can be emptied out periodically by tanker and taken to an appropriate treatment centre, for full processing to separate the remaining biodegradable material from the non-biodegradable, and further treat the biodegradable material.

Another issue with septic tanks is odours due to the presence of anaerobic bacteria which produce Hydrogen Sulphide (H_2S). H_2S, formed as a result of anaerobic fermentation, is a gas which goes into solution, and subsequently gets released again when the wastewater is agitated. This can lead to odours emanating from the effluent pipe of the septic tank as the wastewater flows out and through the distribution system to the package plants.

This issue can be avoided by de-gassifying the effluent wastewater to strip out H_2S and other odorous compounds continually, thus providing an odour free effluent, clear effluent. An ideal way to do this is with a Venturi aerator, which aggressively mixes the wastewater with air, providing an easy escape route for the H_2S. This process is also efficiently adds oxygen to the wastewater, which ensures no further creation of H_2S in the effluent, and results in an odour free effluent passing on to the package plants.

The CAST system can either be a single tank, or alternatively a series of tanks. In the case of Ballylongford, it is proposed to use a single septic tank due to the volume required.

The CAST system will not only reduce the BOD load from the village but will also act as a buffer, smoothing out peaks in loadings which can occur, which will aid the efficient operation of the package plant. The effluent from the CAST system will discharge to the package plant and from there the effluent will pass to the tidal tank.

The package plant proposed is based on fixed film process, as this has reduced operating and maintenance costs and provides the required level of treatment. As the BOD removal process is a respiration rather than growth process, smaller amounts of sludge are generated. Excess sludge from the package plant will be pumped to the CAST tank, where it will biodegrade along with the other solids in the tank, leading to reduced volumes for transport. The use of the CAST tank will also protect the package plants and help prolong the asset life.

The package plants will initially be connected in series and at a later stage, when the load to the plant develops, the flow can be diverted so the tanks are in parallel.

5.6 Wastewater Treatment Plant Site

The proposed treatment plant site is to the northern edge of the Development Boundary. The site is hidden from the road and adjacent to some agricultural buildings. It is also located at a low point thus minimising pumping heads.

5.7 Outfall / Foreshore Licence

It is proposed to use the existing northern outfall as the primary outfall for the entire village, however, given the environmental designations of the area, it would be recommended to seek a foreshore licence for the construction of a new outfall in the estuary at some future point. Whilst this outfall is not necessary at this point, the granting of a foreshore licence would enable the construction of a modern low impact, hidden outfall, and enable the removal of the existing outfalls, which have a negative visual impact of the location at low tide.

5.8 Sludge

The sludge quantities produced at Ballylongford will undergo fermentation and volume reduction in the septic tank. Published data rates of sludge accumulation in a septic tank have been used to predict scum and sludge accumulations. This enables a determination of septage pumping intervals, based on data collected in various studies of septic tanks. The data specified that over a 1 year period, 227 l of sludge is generated per capita. This equates to 360 m^3 of sludge per year for Ballylongford at 1,600 p.e. Additional sludge is generated by passing the treated effluent from the CAST system through the package plant.

The US EPA specify that for every 1 kg of BOD removed, 0.27 kg of sludge is produced using fixed film technologies. Therefore the ultimate total sludge generated per annum at Ballylongford would be of the order of 423 m^3. Desludging of the septic tank and package plant would need to take place twice a month. The liquid sludge will be transported to Listowel Sewage Treatment Works where it will be screened, thickened and dewatered to 18% in accordance with the Sludge Management Plan.

Septic tank sludge is generally in the order of 3% DS and the installation of a picket fence thickener would not make much of an impact on the sludge volumes generated at Ballylongford. Transport costs for moving the sludge are estimated to be approximately €11,500 per annum. The NPV over a 20 year period would be approximately €142,000. The sludge volumes at Ballylongford could be effectively reduced by installation of a sludge dewatering unit on site and transporting the dewatered cake. However the capital and OPEX cost for installation of this unit would be in the region of €500,000. Transporting the liquid sludge to the Listowel works is therefore a more economical solution.

6.0 PROJECT PHASING, COSTS AND PROCUREMENT

6.1 Project Phasing

Given the small size of this scheme, it is recommended to add the required infrastructure in a single phase for the treatment plant, and for the network. The transfer of flows from the west of the river is also required to be carried out under Phase I, along with the construction of stormwater facilities to prevent spills from the combined system.

The remaining sewer extensions could be carried out as and when development pressures require them, however, these extensions are relatively short and could be carried out at this stage to aid the growth of the village, particularly in the core area to join the two sides of the village.

The treatment plant will essentially operate to a similar degree of treatment efficiency in terms of settleable particulate matter which will remain in the CAST tank, whereas soluble material will pass through for further treatment. The venturi aeration will ensure an aerobic odour free effluent. As its primary function is degasification, and oxygenation, loading has a minimal effect – it is the flow through which is the primary factor. The package plants will be connected in series initially and switched to parallel operation once the load to the plant requires it.

6.2 Capital Costs

The capital costs for the scheme are detailed in the Appendix, summarised as follows:

Capital Costs	
WwTP	€1,248,728.14
Network Upgrades & Repairs	€635,777.34
Network Extensions (Phase I)	€398,214.75
Total	**€2,282,720.23**

This allows for the following:

Network

- West Pump Station
- Stormwater Tank at the West Pumping Station
- Trunk Main Upgrades
- Network Refurbishment
- Network Extensions

WWTP

- Land Costs
- Stormwater Tank
- Pumping Station
- CAST Tank
- Package Plants
- Tidal Tank
- Access Road
- Fencing
- Kiosk

6.3 Scheme Operation and Maintenance Costs

The operation and maintenance costs for the scheme are as follows:

Operating Costs	
WwTP	€14,370.15
Network	€995.83
Total	**€15,365.98**

This allows for the following:

Network

- Pumping Costs
- Servicing

WWTP

- Desludging
- Transport Costs
- Package Plant Operating Costs
- Pumping Costs

The whole life cost of this scheme is **€2,473,258** or **€11,777** per existing house.

6.4 Marginal Cost Analysis

The marginal cost analysis is subject to a separate report.

6.5 Technical Innovation and Cost Effectiveness

6.5.1 *Introduction*

Fundamental to any assessment will be the affordability analysis of the project. The Water Services Investment Programme details the budgets to be allocated to specific schemes. If a proposed scheme exceeds this budget then its affordability must be questioned and a technical and financial justification of the scope of the scheme is required. The appropriate phasing of the scheme may ensure affordability. The Value For Money (VFM) assessment should then be conducted on the affordable project.

In assessing and achieving VFM on a given Government funded project it is important to understand the 'need' for the project and the funding avenues open to fund the project. Figure 6.1 illustrates the possible 'need' for a given project and the subsequent actions required to open particular funding avenues.

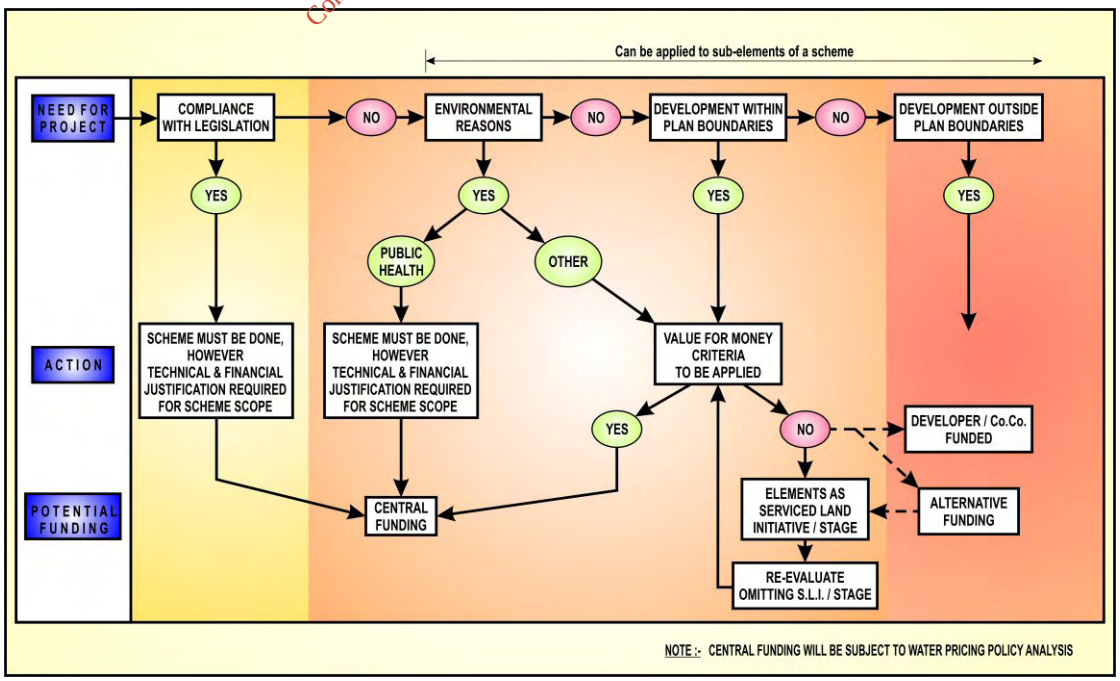

Figure 6.1 - Need for Project Schematic

The main aims of carrying out a value for money assessment are:

- To confirm that the scope of the scheme is valid.
- To ensure that the technical requirements / specification of the scheme is valid.
- To ensure that capital spending is appropriately allocated (i.e. Government / Local Authority / Private).
- To increase the transparency in financial decision making.

In carrying out the value for money assessment one particular limitation should be recognised. That is the difficulty in costing innovative solutions where the current evidence base is limited and thus true costs are difficult to assess. In these instances a conservative approach should be used so as to avoid the under-reporting of costs.

The assessment of the potential to deliver Value for Money (VFM) is an essential element of any Public Private Partnership. The criteria which apply regarding VFM are different for the separate elements of the scheme and are addressed below.

6.5.2 *Collection Network*

For the purpose of the report the collection network shall be assumed to include all collection mains, and associated pump stations.

Traditional contract procedures have generally resulted in competitive pricing for pipeline installations. Once pipeline routes have been agreed, site investigations carried out and wayleave agreements reached the contracts have been procured with little scope for innovation. However, as the client carries the risks associated with design changes, unforeseen ground conditions, variations etc. considerable cost overruns have arisen on some projects.

6.5.3 *Treatment Works / Outfall Pipe*

It is generally accepted that economic advantages exist through bringing the expertise of a Contractor and Process Designer together to achieve a higher level of innovation that might be expected with conventional contracts. This applies for both the DB and the DBO approaches. In relation to the operation of a treatment plant, it would appear that DBO offers better potential for overall cost savings then DB. This would stem from the assumption that as the Tenderer has to run the plant for a long period, the design of the plant will encompass more operational efficiencies in DBO that in DB format.

6.5.4 *Comparative Costs*

In carrying out a VFM the proposed scheme needs to be compared against a defined benchmark. In this instance the cost of providing an individual treatment solution to a dwelling is deemed suitable. As with any financial assessment it is the whole life costs that should be examined rather than pure capital. Therefore when considering the whole life costs the following factors need to be accounted for:

- Unit package plant
- Constructed percolation area due to poor ground.
- Electricity and maintenance charges for 20 years.
- Monitoring and sampling for 20 years to ensure the process is operating efficiently and correctly.
- Desludging for 20 years.

Following market research into the above factors the following costs have been derived.

Table 6.1 – Life Cost of Single Dwelling Treatment Unit

Cost	Element	Cost (€ incl VAT)	Comment
Capital	Treatment	4,540	Average Cost
	Percolation	2,840	Typical Cost
Operating	O&M (NPV)	3,000	180/yr + maint.
	Sampling / Monitoring (NPV)	800	€200/5 years
	De-sludge (NPV)	3,750	250/yr
Life Cost per Dwelling		14,930	

The cost of €14,930 is the comparative cost to be used to determine value for money. With reference to the whole life cost of **€11,777** per house this scheme provides a value for money solution.

6.6 Procurement

Kerry County Council propose, as part of the programme of water services infrastructure development in the period 2004 –2010, to undertake significant investment in the construction and operation of existing, new and expanded wastewater treatment facilities in a total of 90 towns and villages throughout the County.

Kerry County Council propose to maximise the benefits of the Design-Build and Design-Build-Operate procurement and bundling methodology by undertaking these significant infrastructural projects under the umbrella of the County Kerry Wastewater and Sludge Project. This project will assess the technical, financial and operational requirements of each of the 90 wastewater projects in an integrated manner and will identify the Strategy for Delivery to be adopted that will achieve efficient delivery of the county-wide wastewater infrastructure and the optimum long-term operational structure of both new and existing works.

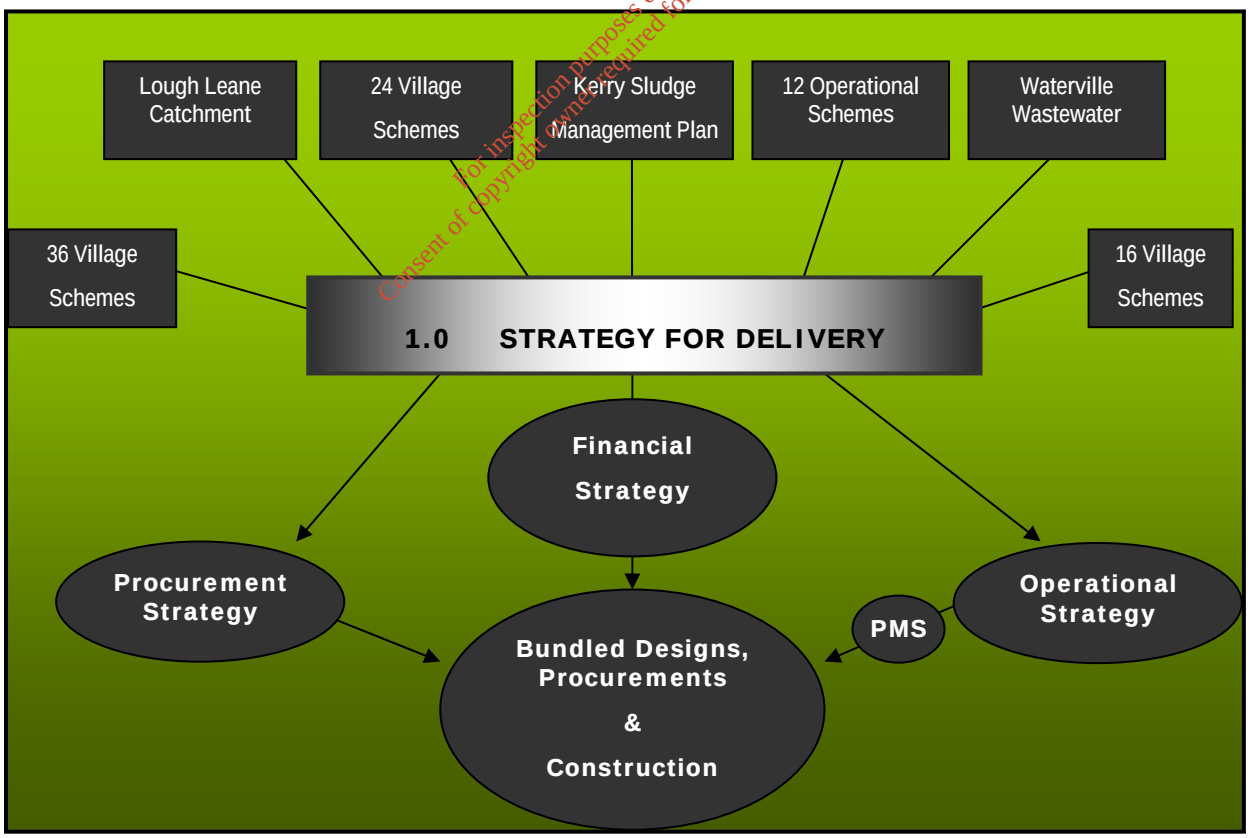

Figure 6-1 - County Kerry Wastewater & Sludge Project - Strategy for Delivery

Due to the urgent need for an effective wastewater infrastructure in Ballylongford village, it is proposed that procurement for Phase 1 of this project should proceed immediately in accordance with conventional tendering procedures. It is proposed that the long-term operation of the Ballylongford wastewater treatment plant would be assessed and implemented in accordance with the recommendations of the Strategy for Delivery to be identified under the County Kerry Wastewater and Sludge Project.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Population projections and water quality were assessed and effluent standards were calculated to aid selection of the best wastewater treatment process applicable to Ballylongford. Appropriate costs were determined on the basis of these selections. The conclusions of this report can be summarised as follows:

- The existing PE is estimated at 667 PE
- The 2026 Design PE is estimated at 1,200 PE
- The Capital Cost of the Scheme is €2,282,720 (inc VAT).
- The Capital Cost per existing PE is €3,422
- The Capital Cost per existing house is €10,870
- The Capital Cost per hectare land serviced is €75,737
- The most appropriate receiving water is the existing receiving water.
- The required minimum effluent standards are: 25mg BOD/l, 35mg SS/l
- The existing area is 19.63 ha.
- The Phase 1 area is 10.51 ha
- The Capital Cost of the proposed Storm Network is €535,923 (inc VAT).

7.2 Recommendations

The following recommendations are proposed for Ballylongford Sewerage Scheme:

- Ballylongford provides value for money scheme and Phase I should be advanced.

- The procurement of the scheme should follow the recommendations of the County Kerry Strategy for Delivery.

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APPENDIX 1

Population Equivalent Estimates

Nicholas O'Dwyer
CONSULTING ENGINEERS

Calculation Sheet

		Rev	Date	By
Project Name:	Kerry Advance Study			
Project Number:	20367	*1.0*	*26-May-06*	*C.Noonan*
Sheet:	1 of 2			

Ballylongford Population Estimate

From Geodirectory

Residential Houses	210
Shops/Supermarkets	3
Public Houses	6
Post Office	1
Commercial Offices	3
Hairdressers	2
Church	1
Primary School (Scoil Oilbhear Naofa)	1
Garages/Car Repair	4
Community Hall	1
Garda Station	1
Fire Station	1

Ballylongford Planning Permissions

Reference No.	Description	Planning Status	Decision Type	System Type
031077	23 houses			
031599	2 houses			
031783	1 house			
031800	1 house			
032237	2 houses			
033827	1 house			
033922	1 house			
042305	1 house			
043257	2 houses			
043782	1 house			
044256	7 houses			
051210	1 house			
051252	3 houses			
051932	4 houses			

Planning Residental	50
Under Construction	0
Planning	50
Shop	0
Parish Hall	0

Existing Population Assessment

	No.	P.E./per	P.E.
Residential Houses	210	2.9	609
Shops/Supermarkets	3	1	3
Public Houses	6	3	18
Post Office	1	1	1
Church	1	1	1
Commercial Offices	3	1	3
Hairdressers	2	2	4
Primary School (Scoil Oilbhear Naofa)	104	0.2	20.8
Garages/Car Repair	4	1	4
Community Centre	1	1	1
Garda Station	1	1	1
Fire Station	1	1	1
Existing PE			666.8
Residential Under Construction	0	2.9	0
Commercial Under Construction	0	1	0
Total PE			666.8
Residential Planning Permissions	50	2.9	145
Amenity Planning Permissions	0	1	0
Future PE			811.8

Determination of Domestic Growth Rates

Residential Development Area Available	37.77	Ha
Permitted Residential Devlopment - Future (Rezoning)	18.885	Ha
Site area allocated per house	0.067	Ha
No. of houses that could be built in future	283	Houses
Additional PE in Residential Zoned Area	820.7	P.E.
Existing Domestic Population	609	P.E.
Total Domestic Population 2026	1429.7	P.E.

High Growth Rate determined by achieving total domestic p.e

Say additional planning to be built by 2010

Kerry County Growth Rate 1996 - 2002 0.83% per annum

Determination of Commercial Growth Rate

Commercial/Institutional Development Area Available	3.46	Ha
Water Consumption per Hectare per day	10	m3/hectare/day

Water Consumption per day 34.6 m3/day
Equivalent Commercial/Institutional PE 154 P.E.

Nicholas O'Dwyer CONSULTING ENGINEERS

Calculation Sheet

		Rev	Date	By
Project Name:	Kerry Advance Study			
Project Number:	20367	*1.0*	*26-May-06*	*C.Noonan*
Sheet:	2 of 2			

Domestic Growth Rates

High	4.08%
Medium	2.04%
Low	0.83%

Year	Domestic PE	High Growth Rate	Domestic PE	Medium Growth Rate	Domestic PE	Low Growth Rate
1966	552.00					
1971	504.00					
1979	545.00					
1981	586.00					
1986	523.00					
1991	506.00					
1996	499.00					
2002	405.00					
2006	609.00		609.00		609.00	
2007	645.25	4.08%	645.25	2.04%	645.25	0.83%
2008	681.50	4.08%	681.50	2.04%	681.50	0.83%
2009	717.75	4.08%	717.75	2.04%	717.75	0.83%
2010	754.00	4.08%	754.00	2.04%	754.00	0.83%
2011	784.76	4.08%	769.38	2.04%	760.26	0.83%
2012	816.78	4.08%	785.08	2.04%	766.57	0.83%
2013	850.11	4.08%	801.09	2.04%	772.93	0.83%
2014	884.79	4.08%	817.43	2.04%	779.35	0.83%
2015	920.89	4.08%	834.11	2.04%	785.81	0.83%
2016	958.46	4.08%	851.13	2.04%	792.34	0.83%
2017	997.56	4.08%	868.49	2.04%	798.91	0.83%
2018	1038.26	4.08%	886.20	2.04%	805.54	0.83%
2019	1080.63	4.08%	904.28	2.04%	812.23	0.83%
2020	1124.71	4.08%	922.73	2.04%	818.97	0.83%
2021	1170.60	4.08%	941.55	2.04%	825.77	0.83%
2022	1218.36	4.08%	960.76	2.04%	832.62	0.83%
2023	1268.07	4.08%	980.36	2.04%	839.53	0.83%
2024	1319.81	4.08%	1000.36	2.04%	846.50	0.83%
2025	1373.66	4.08%	1020.77	2.04%	853.53	0.83%
2026	1429.70	4.08%	1041.59	2.04%	860.61	0.83%

Year	Commercial / Inst. PE	Fixed Growth Rate
2006	58.80	
2007	61.70	4.93%
2008	64.74	4.93%
2009	67.94	4.93%
2010	71.29	4.93%
2011	74.80	4.93%
2012	78.49	4.93%
2013	82.36	4.93%
2014	86.42	4.93%
2015	90.69	4.93%
2016	95.16	4.93%
2017	99.85	4.93%
2018	104.78	4.93%
2019	109.94	4.93%
2020	115.37	4.93%
2021	121.06	4.93%
2022	127.03	4.93%
2023	133.29	4.93%
2024	139.86	4.93%
2025	146.76	4.93%
2026	154.00	4.93%

Year	Total Population Estimate		
	High Estimate	Medium Estimate	Low Estimate
2006	667.80	667.80	667.80
2007	706.95	706.95	706.95
2008	746.24	746.24	746.24
2009	785.69	785.69	785.69
2010	825.29	825.29	825.29
2011	859.56	844.18	835.06
2012	895.27	863.57	845.06
2013	932.47	883.45	855.29
2014	971.21	903.86	865.77
2015	1011.57	924.80	876.50
2016	1053.62	946.28	887.50
2017	1097.42	968.34	898.77
2018	1143.04	990.98	910.32
2019	1190.57	1014.23	922.17
2020	1240.08	1038.10	934.34
2021	1291.66	1062.61	946.82
2022	1345.39	1087.79	959.65
2023	1401.36	1113.65	972.82
2024	1459.67	1140.22	986.37
2025	1520.42	1167.53	1000.29
2026	1583.70	1195.59	1014.61

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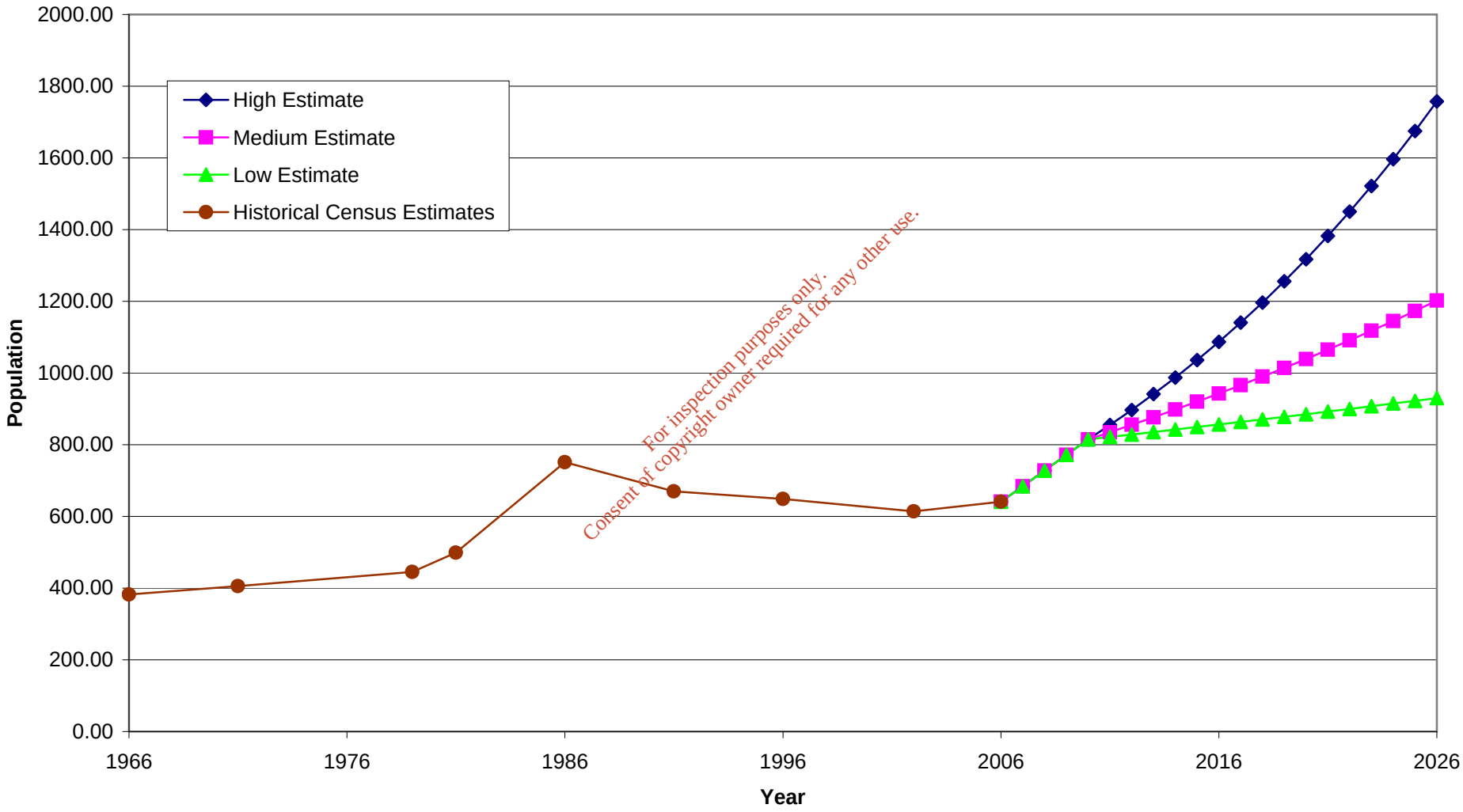
Ballyduff Domestic Population Estimates



APPENDIX 2

Design Assessment of Existing Scheme

Existing Network

Ballylongford is served by two combined gravity sewer systems. The systems are separated by the Ballyline River. The system to the West drains to a holding tank that discharges by gravity to the foreshore. During times of high water a pumping arrangement is used to effect a discharge from the holding tank. The system to the East is a gravity discharge directly to the river via box culvert that is approximately 150 m long. This culvert is visible at low tide. The system to the East has the larger contributing load. The amount of storm water connections to the system has been noted as a cause of concern by the Caretaker. However no problems are noted with the system.

Existing Wastewater Treatment Plant

The western network feeds to a pumping station (Photo 2.2) with manually raked coarse screening (Photo 2.1) upstream.

The eastern effluent discharges via gravity outfall to the River (Photo 2.3), there is also a rising main along the side of the outfall for periods of high tide.

The western effluent discharges via gravity outfall to the River (Photo 2.4).

Photo 2.1 Inlet Screening on western network

Photo 2.2 Pumping Station

Photo 2.3 Western outfall

Photo 2.4 Eastern Outfall

APPENDIX 3

Design of Proposed Collection Network and Pumping Stations

The design of the wastewater collection network has been carried out by creating a model of the network using Wallingford InfoWorks CS 7.5 Software. The design included the following constraints:

- The diameter of all pipework is a minimum of 225 mm in accordance with good engineering practice. This will also reduce the potential for blockages in the network.
- The minimum gradient is 1/180.
- The sewer crown is a minimum of 1.2 m below ground level.
- House connections shall be a minimum of 150 mm and shall be brought to the boundary line of the property to be connected.
- The trunk sewer network is designed to carry flows up to 6 times Dry Weather Flow.
- All future developments should be constructed as separate foul and surface water systems, using SuDS principles.
- The extent of the proposed network is as shown on Drawing No. 20367-BD-07.

Stormwater Network

The proposed stormwater network was designed to cater for future development. The surface water drainage zones were determined by the land use designation of the proposed development areas in conjunction with existing land boundaries.

The route of the surface water network was determined from the levels of the existing wastewater collection network and the location of the nearest watercourse. The capacity of these watercourses to receive the increased runoff has not been assessed.

Stormwater runoff from new developments can lead to harmful effects. It is recommended the use of SUDS (Sustainable Drainage Systems) to provide hydraulic, water quality and environmental benefits. The volume of runoff from developments should be restrained to that of greenfiled runoff. The permissible stormwater outflow from the surface water catchments is calculated in accordance with SUDS. The Institute of Hydrology Report No. 124 gives estimation for calculating this flow as follows:

$$Q_{BAR} = 0.0018 \times (AREA)^{0.89} \times (SAAR)^{1.17} \times (SOIL)^{2.17}$$

Where;

Q_{BAR} = Mean annual peak flow (m^3/s)
AREA = Area of catchment (km^2)
SAAR = Standard Annual Average Rainfall (mm)
SOIL = Soil Index

The outflow rates are calculated using a SOIL index of 0.45 (obtained from Flood Studies Reoort, 1975) and a SAAR value of 1200 mm (www.meteireann.ie). Any flow above the allowable flow should be stored within the surface water catchment area. SUDS techniques should be considered as a method to store stormwater on site. The sizing of the stormwater pipes was calculated using the Colebrook-White Equation based on the permissible outflow rates.

These sizes are an initial assessment only and a more detailed analysis should be carried out to justify/modify the pipe sizes and gradients to ensure adequate level of service. This normally requires simulation modeling to enable an assessment of the flood risk for extreme events.

Area (Km2)	QBAR (l/s)	Pipe Length (m)	Gradient 1 in ()	Capacity (Colebrook-White) (l\s)	Pipe Diam (mm)	Sewers
0.229	159.263	99	35	355.649	400	PS5 - PS4
		104	26	412.75	400	PS4 - PS3
		87	38	341.322	400	PS3 - ES15
		53	51	294.465	400	ES15 - ES14
		29	26	412.75	400	ES14 - ES13
		32	13	584.036	400	ES13 - ES12
		71	35	355.649	400	ES12 - PS2
		63	66	258.779	400	PS2 - PS1
		19	16	526.299	400	PS1 - OF1
		115	67	256.84	400	PS2.3 - PS2.2
		111	48	303.61	400	PS2.2 - PS2.1
		108	20	470.736	400	PS2.1 - PS2.0
0.098	75.153	97	448	98.869	400	PS10 - PS9
		95	328	115.673	400	PS9 - PS8
		89	369	107.836	400	PS8 - PS7
		67	300	122.42	400	PS7 - PS6
		33	146	173.754	400	PS6 - ES8
0.049	40.278	123	44	147.968	300	ES1 - PS13
		134	69	118.071	300	PS13 - PS12
		111	53	134.787	300	PS12 - PS11
		36	19	225.399	300	PS11 - OF3
0.178	127.471	50	71	249.5	400	PS17 - PS16
		49	69	253.091	400	PS16 - PS15
		73	68	254.945	400	PS15 - PS14
		62	82	232.1	400	PS14 - ES5

APPENDIX 4

Design of Proposed Treatment Process

Treatment Plant Design

The CAST tank is sized for the high growth scenario due to the small additional cost of providing extra tank volume, however, the proposed treatment plants are designed for a particular population equivalent, two 600 p.e. plants in this case. These plants are propriety package plants available on the market, and the design rules would therefore be propriety to the selected equipment, however for the purposes of approximate sizing, the design of a conventional activated sludge plant has been carried out for the plant.

Ballylongford WWTW (AS Outline Design)

	Existing	Phase 1
Population equivalent	670	1,200
Flow (l/h/d):	225	225
Daily flow (m^3/day):	150.8	270.0
Dry weather flow (l/s)	1.74	3.13
Treatment Plant Flows		
Peak flow (x DWF):	3	3
Peak flow (l/s):	5.2	9.4
Sludge recycle (l/s):	1.7	3.1
Treatment Plant Loadings		
BOD loading (g/h/d)	60	60
BOD loading (kg/day):	40.2	72.0
SS loading (g/h/d)	75	75
SS loading (kg/day):	50.3	90.0
Nitrogen loading (g/h/d)	9	9
Nitrogen loading (kg/day):	6.03	10.80
Phosphorous loading (g/h/d)	2.25	2.25
Phosphorous loading (kg/day):	1.51	2.70
Influent Concentrations		
BOD (mg/l)	266.7	266.7
SS (mg/l)	333.3	333.3
Nitrogen (mg/l)	40.0	40.0
Phosphorous (mg/l)	10.0	10.0
Effluent Concentrations Required - After Secondary Treatment		
BOD (mg/l)	25	25
SS (mg/l)	35	35
Ammonia-Nitrogen (mg/l)	7	7
Phosphorus (mg/l)	2.00	2.00

Aeration Tanks

Tank length (m)	7	7
Tank width (m)	3	3
Liquid depth (m)	6	6
Number of tanks	2	3

Volume (m^3)	252	378	
BOD Loading (kg/day)	40.2	72	
MLSS (kg/m^3)	1.25	1.25	
f/m ratio:	0.128	0.152	Should be ~ 0.1
Sludge production (kg/kg BOD removed):	1.11	1.11	
Sludge age (days)	7.03	5.89	~10 (>10 nitrification, < 10 no nitrification)
Minimum temperature (ºC)	10	10	
Maximum temperature (ºC)	15	15	
Fmin = $1.072^{(T - 15)}$	0.706	0.706	
Fmax = $1.072^{(T - 15)}$	1.000	1.000	

Oxygen Requirements

Carbonaceous			Equation 28, ATV 131
Specific oxygen consumption:	1.22	1.14	kg.O2/kg.BODrem (1.6 max.)
BOD removal required	95%	95%	
Peak factor for carbonaceous BOD	1.35	1.35	
Average carbonaceous oxygen consumption:	46.8	77.7	kg.O2/day
Maximum carbonaceous oxygen consumption:	63.1	104.9	kg.O2/day
Nitrogen Oxygen Requirement			
Ammonia oxygen consumption:	4.16	4.16	kg.O2/kg.Nrem
Denitrification oxygen release:	2.86	2.86	kg.O2/kg.Nreleased
Ammonia removal required:	50%	50%	
Denitrification:	25%	25%	
Peak factor for nitrification:	2	2	
Average nitrificiation oxygen consumption:	8.23	14.74	kg.O2/day
Maximum nitrificiation oxygen consumption:	16.46	29.48	kg.O2/day
Total oxygen consumption:	63.2	107.2	
Dissolved oxygen concentration at 20 C (mg/l)	9.08	9.08	
D.O. concentration required (mg/l)	2	2	
Field transfer rate (FTR):	81.1	137.5	kg.O2/day
Oxygen transfer factor, α :	0.65	0.65	
Peak standard oxygen transfer rate (clean water):	5.2	8.8	kg.O2/hr
A 10% safety factor should be allowed for the SOTR so the design SOTR will be:			
Design standard oxygen transfer rate (clean water):	5.7	9.7	kg.O2/hr
Oxygen transfer efficiency (kg.O2/kW.hr):	2.5	2.5	
Estimated power requirement (kW):	2.3	3.9	

Sludge production

Waste activated sludge production			
Ratio of SS to BOD in influent:	1.25	1.25	
Sludge age:	7.03	5.89	> 7 for no nitrification, or 10 - 15 if nitification required
Sludge production (kg/kg BOD removed):	1.196	1.215	Equation 27, ATV 131
Sludge production (kg/kg BOD removed):	1.114	1.114	
BOD removed in activated sludge process:	36.43125	65.25	kg/day
Quantity of waste activated sludge:	40.6	72.7	kg/day
Total sludge production:	**40.6**	**72.7**	**kg/day**
	14.8	**26.5**	**tds/a**
Volume of sludge (@ 1% d.s.)	4.1	7.3	m³/day
Volume of sludge (@ 3% d.s.)	1.4	2.4	m³/day
Volume of sludge (@ 18% d.s.)	0.2	0.4	m³/day

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballylongford/Kerry	*1.0*	*21-Mar-06*	*M. Davitt*
Sheet:	1 of 1			

CAST Design Calculation Sheet

Population Equivalent	1600		* to cater for ultimate population
Water Consumption	200	l/h/d	
Design DWF	320,000	l/d	
Peak Flow	667	l/min	
Septic Tank Volume	290,000	l	
Main Volume	193,333	l	
Secondary Volume	96,667	l	
Aeration Retention Time	20	min	
Aerated Volume	13333	l	
	13.33	m^3	
Total CAST Volume	303,333	l	
	303	m^3	
Total Retention Time	23	hours	
CAST Size			
Depth	3000	mm	
Plan Area	101.11	m^2	
L/W Ratio	2		
Width	7.11	m	
Length	14.22	m	
Aerated Plan Area	4.44	m^2	
Width and Length	2.11	m	
Post Aeration			
Inlet O2	0	mg/l	
Outlet O2	10	mg/l	
Mass O2	0.13	kg	
Transfer	0.40	kgO2/h	
Transfer Rate	1.15	kg O2/kW.h	
Aerator Required	0.35	kW	

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Calculation Sheet

		Rev	Date	By
Project Name:	Kerry Advance Study			
Project Number:	20367	*1.0*	*26-May-06*	*C.Noonan*
Sheet:	1 of 1			

Ortho P To Total P	65 %		
Q5 Ortho P Limit	0.015 mg/l	Phase 1 PE	1200
Q 4-5 Ortho P Limit	0.02 mg/l	Phase 2 PE	1800
Q4 Ortho P Limit	0.03 mg/l		
Q3-4 Ortho P Limit	0.045 mg/l		
Q3 Ortho P Limit	0.07 mg/l		

Ballylongford WAC

	Dry Weather Flow m³/d	Background BOD Conc mg/l	Allowable Downstream BOD Conc mg/l	95%ile flow in stream m³/d	Allowable BOD effluent conc mg/l	Allowable BOD load kg/d
Phase 1 - 1DWF	270	2.3	4	1940	16.21	4.38
Phase 1 - 3DWF	810	2.3	4	1940	8.07	6.54
Phase 1 - 6DWF	1620	2.3	4	1940	6.04	9.78
Phase 2 - 1DWF	405	2.3	4	1940	12.14	4.92
Phase 2 - 3DWF	1215	2.3	4	1940	6.71	8.16
Phase 2 - 6DWF	2430	2.3	4	1940	5.36	13.02

	Dry Weather Flow m³/d	Background Ortho P Conc mg/l	Allowable Downstream Ortho P Conc mg/l	Average flow in stream m³/d	Allowable Total P effluent conc mg/l	Allowable Total P load kg/d
Phase 1 - 1DWF	270	0.045	0.05	41586.61	1.26	0.34
Phase 1 - 3DWF	810	0.045	0.05	41586.61	0.47	0.38
Phase 1 - 6DWF	1620	0.045	0.05	41586.61	0.27	0.44
Phase 2 - 1DWF	405	0.045	0.05	41586.61	0.87	0.35
Phase 2 - 3DWF	1215	0.045	0.05	41586.61	0.34	0.41
Phase 2 - 6DWF	2430	0.045	0.05	41586.61	0.21	0.51

	Dry Weather Flow m³/d	Background Ammonia Conc mg/l	Allowable Downstream Ammonia Conc mg/l	95%ile flow in stream m³/d	Allowable Ammonia effluent conc mg/l	Allowable Ammonia load kg/d
Phase 1 - 1DWF	270	0.09	1	1940	7.54	2.04
Phase 1 - 3DWF	810	0.09	1	1940	3.18	2.58
Phase 1 - 6DWF	1620	0.09	1	1940	2.09	3.39
Phase 2 - 1DWF	405	0.09	1	1940	5.36	2.17
Phase 2 - 3DWF	1215	0.09	1	1940	2.45	2.98
Phase 2 - 6DWF	2430	0.09	1	1940	1.73	4.20

	Dry Weather Flow m³/d	Background SS Conc mg/l	Allowable Downstream SS Conc mg/l	95%ile flow in stream m³/d	Allowable SS effluent conc mg/l	Allowable SS load kg/d
Phase 1 - 1DWF	270	10	25	1940	132.76	35.84
Phase 1 - 3DWF	810	10	25	1940	60.92	49.34
Phase 1 - 6DWF	1620	10	25	1940	42.96	69.59
Phase 2 - 1DWF	405	10	25	1940	96.84	39.22
Phase 2 - 3DWF	1215	10	25	1940	48.95	59.47
Phase 2 - 6DWF	2430	10	25	1940	36.97	89.84

APPENDIX 5

Cost Estimates

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballylongford	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	1 of 6			

Financial Summary Sheet

Capital Costs

WwTP	€1,248,728.14
Network Upgrades & Repairs	€635,777.34
Network Extensions	€398,214.75
Total	**€2,282,720.23**

Operating Costs

WwTP	€14,370.15
Network	€995.83
Total	**€15,365.98**
NPV Total	**€190,538.20**

Scheme Whole Life Costs **€2,473,258.43**

	No Houses	Cost Per House
Network Whole Life Cost Per Newly Connected House	12	€33,267.55
Treatment Plant Whole Life Cost Per House (Incl Network Upgra	198	€9,517.70
Whole Scheme Costs per connected House	**210**	**€11,777.42**

Includes VAT, Preliminaries, Supervision, Land, Site Investigations, Fees

Cost Comparisons

Existing PE	667
2026 Design PE	1200
Capital Cost	€2,282,720.23
Capital Cost per Existing PE	€3,422.37
Capital Cost per existing house	€10,870.10
Capital Cost per ha land serviced	€75,737.23
Phase 1 Area (ha)	10.51
Existing Area (ha)	19.63

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballylongford	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	2 of 6			

Operational Cost Calculation Sheet

Network	No	Unit	Power kW	Quantity	Unit	Rate, €	Total, €
Pumping from West	1	Item	1.0056	2920	h	0.11	€323.00
Service	1	Item				500.00	€500.00
						Total	**€823.00**
						VAT @ 21%	€172.83
						Network Total	**€995.83**

WWTP	No	Unit	Power kW	Quantity	Unit	Rate, €	Total, €
Pumping to WWTP	1	Item	2	2920	h	0.11	€642.40
Package Plant	2	Item	0.6164	8760	h	0.11	€1,188.00
Service	2	Item		50	h	50.00	€5,000.00
Desluding & Transport	12	km		12	No	420.48	€5,045.76
						Total	**€11,876.16**
						VAT @ 21%	€2,493.99
						WWTP Total	**€14,370.15**
						Combined Total (Network & WwTP)	**€15,365.98**
						NPV of combined total	**€190,538.20**

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballylongford	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	3 of 6			

BoQ Treatment Plant Calculation Sheet

Treatment Civil Works	Unit	Quantity	Rate, €	Total, €
Site Clearence	m^2	6,971	1	6,971
Stormwater Tank	cu.m.	74	300	22,200
CAST Tank	cu.m.	228	300	68,400
Tidal Tank	cu.m.	150	300	45,000
Package Plant 600pe	no	2	125,000	250,000
Package Plant Civils	no	1	100,000	100,000
Kiosk with Toilet Facilities	no	1	7,500	7,500
Outfall pipe within site	m	65	75	4,875
Manholes	no	3	1,500	4,500
Pipework between units	m	116	50	5,800
Valves and fittings	no	23	750	17,250
Ducting	m	80	15	1,200
Internal roadway	m^2	370	40	14,800
Fencing access road (Pallisade)	m	400	100	40,000
Entry Gates	no	1	1,500	1,500
Landscaping	sq.m.	697	20	13,940
75mm water supply	m	66	40	2,640
3 phase power supply	Item	1	15,000	15,000
Pumping Station	Item	1	30,000	30,000
Sub total Treatment Civil Works				**651,576**
Add Prelims and Contengencies @ 20%				130,315
Add Site Investigation @ 5%				32,579
Sub total excl VAT				**814,470**
Add VAT @ 13.5%				109,953
Sub total incl VAT				**924,423**
Add Land Acquisition	h.a.	0.697	200,000	139,420
Overheads/Fees/Site Supervision @ 20%				184,885
Total Cost of Treatment Civil Works				**1,248,728**

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballylongford	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	4 of 6			

BoQ Pipeline Calculation Sheet

Phase 1 Works

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
150mm Rising Main	m	460	85	39,100
Temporary Road Reinstatement	m^2	552	35	19,320
Permanent Road reinstatement	m^2	552	50	27,600
Package Pump Station & Rising Main	item	5	10,000	50,000
Pumping Station	item	1	30,000	30,000
Sub total Collection System				**166,020**
Add Prelims and Contengencies @ 20%				33,204
Add Site Investigation @ 5%				8,301
Sub total excl VAT				**207,525**
Add VAT @ 13.5%				28,016
Sub total incl VAT				**235,541**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				47,108
Total Collection Network				**282,649**

Assumues sewers generally laid at 2.0m - 2.5m deep.
Bedding and Grannular Surround included

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballylongford	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	5 of 6			

BoQ Pipeline Calculation Sheet

Section A, B C & D Extensions

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in roads	m	730	85	62,050
65mm Pressure Sewer	m	140	100	14,000
Manholes	no	11	1,500	16,500
Service connections	no	12	600	7,200
Sumps	no	5	2,350	11,750
Commission	no	5	500	2,500
Pumps/Fittings/Valves Etc	no	5	8,100	40,500
Kiosk	no	5	750	3,750
Temporary Road Reinstatement	m^2	890	35	31,150
Permanent Road reinstatement	m^2	890	50	44,500
Sub total Collection System				**233,900**
Add Prelims and Contengencies @ 20%				46,780
Add Site Investigation @ 5%				11,695
Sub total excl VAT				**292,375**
Add VAT @ 13.5%				39,471
Sub total incl VAT				**331,846**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				66,369
Total Collection Network				**398,215**

Assumues sewers generally laid at 2.0m - 2.5m deep.
Bedding and Grannular Surround included

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballylongford	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	6 of 6			

BoQ Pipeline Calculation Sheet

Pipeline Upsizing to 225mm and Network Repairs

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in roads	m	265	85	22,525
375mm gravity sewers in roads	m	173	105	18,165
Manholes	no	6	1,500	9,000
Temporary Road Reinstatement	m^2	526	35	18,410
Permanent Road reinstatement	m^2	526	50	26,300
Relining	m	143	115	16,445
Reopen Laterals	no	6	190	1,140
Localised Repairs	no	14	600	8,400
Removal of intrusions	no	16	260	4,160
Repair of Defective Laterals	no	19	600	11,400
Associated sewer cleaning and CCTV work	no	1	21,473	21,473
Mahhole Rehab	no	50	1,000	50,000
Sub total Collection System				**207,418**
Add Prelims and Contengencies @ 20%				41,484
Add Site Investigation @ 5%				10,371
Sub total excl VAT				**259,272**
Add VAT @ 13.5%				35,002
Sub total incl VAT				**294,274**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				58,855
Total Collection Network				**353,128**

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Kerry	*Ballylongford*	*6-Jul-07*	*F. Doherty*
Sheet:	1 of 1			

BoQ Pipeline Calculation Sheet

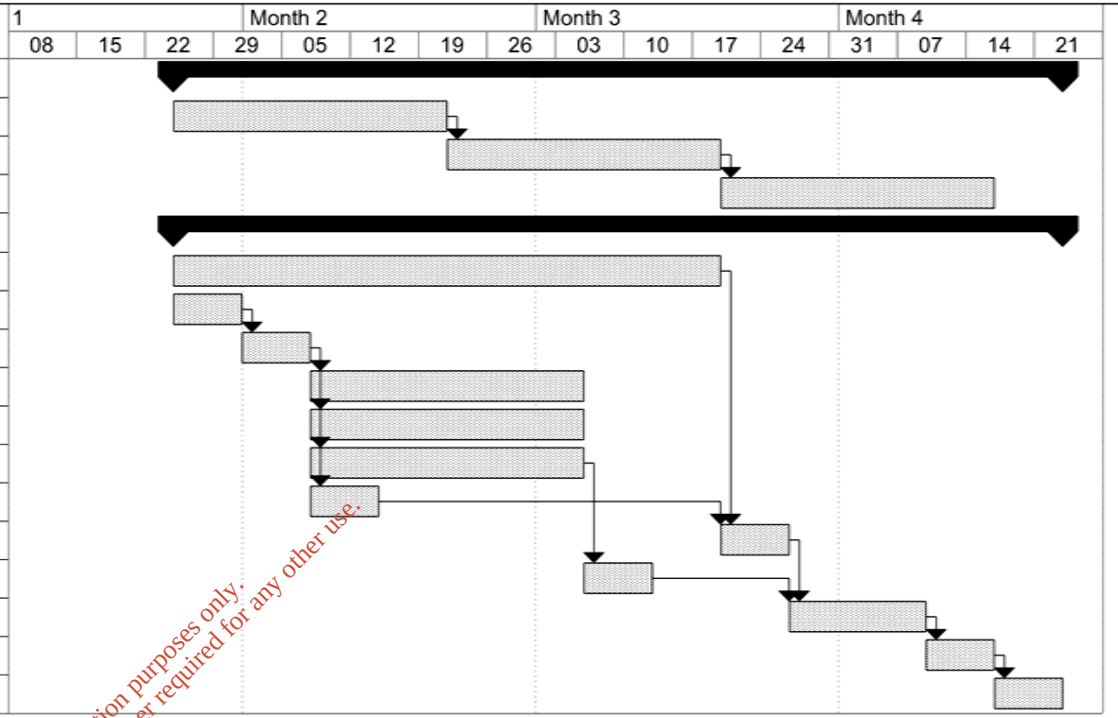
Storm Water Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewer in roads	m	0	63	0
300mm gravity sewer in roads	m	369	95	35,055
400mm gravity sewer in roads	m	1,411	108	152,854
300mm gravity sewers in fields	m	36	68	2,450
400mm gravity sewers in fields	m	33	90	2,952
Reinstatement in roads	m^2	1,780	50	89,000
Reinstatement in fields	m^2	69	1	69
Manholes	no	20	1,500	30,000
Outfall	no	2	1,000	2,000
Sub total Collection System				**314,380**
Add Prelims and Contengencies @ 20%				62,876
Add Site Investigation @ 5%				15,719
Sub total excl VAT				**392,975**
Add VAT @ 13.5%				53,052
Sub total incl VAT				**446,027**
Add Wayleaves Compensation	m	69	10	691
Overheads/Fees/Site Supervision @ 20%				89,205
Total Collection Network				**535,923**

Assumues sewers generally laid at 2.0m - 2.5m deep.
Bedding and Grannular Surround included

APPENDIX 6

Programme of Works

ID		Task Name
1		**Construct Ballylongford Sewerage Scheme**
2		Mobilisation
3		Repair and Upsize Sewers
4		Lay Sewers Extensions
5		**Build Treatment Plant**
6		Order Package Plant
7		Access Road
8		Clear Site
9		Build/Install CAST Tanks
10		Build Tidal Tank
11		Build Pump Station & Storm Tank
12		Package Plant Civils
13		Install Package Plants
14		Install Pumps
15		Connect Pipework
16		Landscape Site
17		Testing/Commissioning



Project: Kerry Wastewater and Sludge
Date: Tue 12/09/06

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

APPENDIX 7

CCTV Survey Report

CCTV Examiner version 2.23
From AMTEC (c) 1990-99

Database	USA5878A
Study	DATABASE
Sort Order	--Not Sorted--
Print Mode	GLOBAL
No. Surveys	49
Survey Distance	1285.8
Report	ENGLISH
Date	28/04/2006
Time	15:57

Report comment

Report : ENGLISH Page : 001 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
1	USA LTD	USA5878	USA5878	0	0	000	SQ99447402X

Date	Time	Location
14/03/2006	10:52	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99447402	0.00	0.000	0.000	SQ99447401	0.00	0.000	0.000

Use	Direction	Size	Shape	Material			
FOUL	DOWNSTREAM	150	CIRCULAR	CONCRETE			
Lining		Pipe	Total	Surveyed	Laid	Video	
NOT SPECIFIED		1.2	100.0	6.8	Z	00001	

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather	Location	
DRY	MAIN ROAD - SUB,-	0001

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	5.80	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Service	6.80	0.0	0.0	0.0	0.0	1.0	1.0	0.1

Extra Data - Structural override
User remarks Service override

Detail

1	0.0		ST	Start Of Survey,
1	0.0		MH	Manhole, SQ99447402
1	0.0		WL	Water Level, 5%
1	0.0	S1	DES	Debris Silt, 5%
	0.6	F1	DES	Debris Silt, 5%
	0.6		CNI	Connection Intruding, 100mm at 10o/c, Int.5mm
	0.9		CN	Connection, 100mm at 3o/c,
	1.4		WL	Water Level, 10%
	3.2		WL	Water Level, 20%
	4.2		WL	Water Level, 30%
	4.6		WL	Water Level, 40%
	5.5		WL	Water Level, 50%
	6.1		CU	Camera Underwater,
2	6.8		SA	Survey Abandoned, UNABLE TO SEE UNDER WATER

Report : ENGLISH Page : 002 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
2	USA LTD	USA5878	USA5878	0	0	000	SQ99447401X

Date	Time	Location
14/03/2006	11:21	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99447401	0.00	0.000	0.000	SQ99448503	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	100.0	27.8	Z	00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

Pre: 0002

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	27.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	23.80	4.0	0.0	0.0	0.0	5.0	2.0	0.2

Extra Data - Structural override
User remarks Service override

Detail

2	0.0	ST	Start Of Survey,
2	0.0	MH	Manhole, SQ99447401
2	0.0	WL	Water Level, 5%
	6.6	JN	Junction, 100mm at 10o/c,
	7.5	JN	Junction, 100mm at 2o/c,
	15.1	EL	Encrustation Light, at 7 to 11o/c,
	15.1	CN	Connection, 100mm at 12o/c,
	15.1	EL	Encrustation Light, at 1 to 4o/c,
	24.6	ELJ	Encrustation Light At Joint, at 7 to 10o/c,
	25.6	ELJ	Encrustation Light At Joint, at 7 to 9o/c,
	27.1	DE	Debris, 5%
3	27.8	SA	Survey Abandoned, UNABLETO PASS DEBRIS

Report : ENGLISH Page : 003 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
3	USA LTD	USA5878	USA5878	0	0	000	SQ99448503X

Date	Time	Location
14/03/2006	11:49	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99448503	0.00	0.000	0.000	SQ99448606	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	100.0	3.1	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

0003

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	2.10	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Service	3.10	0.0	0.0	0.0	0.0	8.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

3	0.0	ST	Start Of Survey,
3	0.0	MH	Manhole, SQ99448503
3	0.0	WL	Water Level, 5%
3	0.0 S1	DE	Debris, 10%
	3.1	CNI	Connection Intruding, 100mm at 12o/c, Int.100mm
	3.1 F1	DE	Debris, 10%
4	3.1	SA	Survey Abandoned, UNABLE TO PASS CONNECTION

Report : ENGLISH Page : 004 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
4	USA LTD	USA5878	USA5878	0	0	000	SQ99448606X

Date	Time	Location
15/03/2006	09:14	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99448606	0.00	0.000	0.000	SQ99448601	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	61.7	61.7	Z	00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....		RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	60.70	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Service	53.70	7.0	0.0	1.0	0.0	39.0	5.0	0.6

Extra Data - Structural override
User remarks Service override

0004

---------- Detail ----------

4	0.0		ST	Start Of Survey,
4	0.0		MH	Manhole, SQ99448606
4	0.0		WL	Water Level, 5%
4	0.0	S1	DE	Debris, 5%
	1.0	F1	DE	Debris, 5%
	5.6		DE	Debris, 5%
	9.7		DE	Debris, 5%
	14.5		JN	Junction, 100mm at 12o/c,
	18.1		JN	Junction, 100mm at 9o/c,
	20.7		EL	Encrustation Light, at 7 to 5o/c,
	20.7		JN	Junction, 100mm at 12o/c,
	21.5		JN	Junction, 100mm at 2o/c,
	25.0		DE	Debris, 5%
	26.0		DE	Debris, 5%
	27.0		DE	Debris, 5%
	27.9		JN	Junction, 100mm at 12o/c,
	28.0	S2	DE	Debris, 5%
	29.0		JN	Junction, 100mm at 2o/c,
	30.8		JN	Junction, 100mm at 10o/c,
	31.2	F2	DE	Debris, 5%
	37.3		EL	Encrustation Light, at 7 to 5o/c,
	37.3		CN	Connection, 100mm at 12o/c,
	39.9		JN	Junction, 100mm at 9o/c,
	40.3		CNI	Connection Intruding, 100mm at 12o/c, Int.5mm
	40.3		EL	Encrustation Light, at 7 to 5o/c,
	44.3		CN	Connection, 100mm at 12o/c, 10
	44.3		EL	Encrustation Light, at 8 to 11o/c,
	47.0		JN	Junction, 100mm at 9o/c,
	50.3		WL	Water Level, 10%
	51.2		JN	Junction, 100mm at 12o/c,

---------- continued..----

4 Plr SQ99448606X Dir DOWNSTREAM Date 15/03/2006 Time 09:14
Location: MAIN STREET , BALLYLONGFORD

Detail (cont.)

	51.2		EL	Encrustation Light, at 7 to 1o/c,
	52.7		JN	Junction, 100mm at 3o/c,
	52.7		EL	Encrustation Light, at 3 to 5o/c,
	52.7		DE	Debris, 5%
	53.7	S3	DE	Debris, 10%
	55.4		JN	Junction, 100mm at 9o/c,
	57.0		WL	Water Level, 20%
	61.0		ELJ	Encrustation Light At Joint, at 12 to 4o/c,
	61.3		EM	Encrustation Medium, at 4 to 6o/c, 15%
	61.7	F3	DE	Debris, 10%
	61.7		MH	Manhole, SQ99448601
5	61.7		FH	Finished Survey,

Report : ENGLISH Page : 006 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
5	USA LTD	USA5878	USA5878	0	0	000	SQ99448601X

Date	Time	Location
15/03/2006	09:53	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99448601	0.00	0.000	0.000	SQ99449708	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	100.0	21.3	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

0005

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	21.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	15.30	3.0	0.0	3.0	0.0	13.0	4.0	0.6

Extra Data - Structural override
User remarks Service override

Detail

5	0.0	ST	Start Of Survey,
5	0.0	MH	Manhole, SQ99448601
5	0.0	WL	Water Level, 5%
	0.7	WL	Water Level, 10%
	0.8	CN	Connection, 100mm at 12o/c,
	1.5	JN	Junction, 100mm at 3o/c,
	2.1	DE	Debris, 20%
	3.0	EMJ	Encrustation Medium At Joint, at 4 to 6o/c, 10%
	3.0	ELJ	Encrustation Light At Joint, at 7 to 8o/c,
	4.0	WL	Water Level, 5%
	13.3	JN	Junction, 100mm at 2o/c,
	13.6	ELJ	Encrustation Light At Joint, at 8 to 4o/c,
	13.6	EMJ	Encrustation Medium At Joint, at 4 to 8o/c, 10%
	13.7	JN	Junction, 100mm at 9o/c,
	13.7	EL	Encrustation Light, at 7 to 9o/c,
	16.1	DE	Debris, 5%
	19.1	DE	Debris, 5%
	21.1	CN	Connection, 100mm at 12o/c,
	21.1	EM	Encrustation Medium, at 12 to 5o/c, 15%
6	21.3	SA	Survey Abandoned, UNABLE TO PASS ENCRUSTATION

Report : ENGLISH Page : 007 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
6	USA LTD	USA5878	USA5878	0	0	000	SQ99449708X

Date	Time	Location
15/03/2006	10:39	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99449708	0.00	0.000	0.000	SQ99449701	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	60.2	60.2	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

0006

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	54.20	4.0	0.0	2.0	0.0	6.0	4.0	0.1
Service	54.20	6.0	0.0	0.0	0.0	7.0	2.0	0.1

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

6	0.0	ST	Start Of Survey,
6	0.0	MH	Manhole, SQ99449708
6	0.0	WL	Water Level, 5%
	1.5	EL	Encrustation Light, at 7 to 5o/c,
	1.8	JN	Junction, 100mm at 9o/c,
	1.8	EL	Encrustation Light, at 7 to 9o/c,
	19.0	JN	Junction, 100mm at 9o/c,
	20.0	JN	Junction, 100mm at 9o/c,
	20.0	EL	Encrustation Light, at 7 to 9o/c,
	20.9	JN	Junction, 100mm at 3o/c,
	20.9	EL	Encrustation Light, at 3 to 5o/c,
	36.3	JN	Junction, 100mm at 9o/c,
	37.0	DE	Debris, 5%
	37.3	JN	Junction, 100mm at 3o/c,
	48.9	JN	Junction, 100mm at 2o/c,
	50.7	JN	Junction, 100mm at 9o/c,
	54.4	CC	Crack Circumferential, at 12 to 12o/c,
	54.4	EL	Encrustation Light, at 3 to 9o/c,
	54.8	CC	Crack Circumferential, at 12 to 12o/c,
	54.8	CL	Crack Longitudinal, at 2o/c,
	55.1	CLJ	Crack Longitudinal At Joint, at 1o/c,
	59.0	CXI	Connection Defective/Intruding, 100mm at 2o/c, Int.5mm
	59.0	H	Hole, at 11 to 3o/c, AROUND CONNECTION
	59.9	EL	Encrustation Light, at 7 to 8o/c,
	60.2	MH	Manhole, SQ99449701
7	60.2	FH	Finished Survey,

Report : ENGLISH Page : 008 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
7	USA LTD	USA5878	USA5878	0	0	000	SQ99449701X

Date	Time	Location
15/03/2006	11:00	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99449701	0.00	0.000	0.000	SQ99449806	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	68.7	68.7	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

0007

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	66.70	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Service	63.70	5.0	0.0	0.0	0.0	9.0	1.0	0.1

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

7	0.0	ST	Start Of Survey,
7	0.0	MH	Manhole, SQ99449701
7	0.0	WL	Water Level, 5%
	1.0	JN	Junction, 100mm at 9o/c,
	1.0	EL	Encrustation Light, at 7 to 9o/c,
	11.8	JN	Junction, 100mm at 2o/c,
	11.8	EL	Encrustation Light, at 3 to 5o/c,
	16.4	JN	Junction, 100mm at 9o/c,
	16.8	CXI	Connection Defective/Intruding, 100mm at 2o/c, Int.5mm
	16.8	EL	Encrustation Light, at 3 to 5o/c,
	16.8	H	Hole, at 10 to 3o/c, AROUND CONNECTION
	21.7	JN	Junction, 100mm at 3o/c,
	25.3	JN	Junction, 100mm at 10o/c,
	25.3	EL	Encrustation Light, at 7 to 9o/c,
	29.0	JN	Junction, 100mm at 2o/c,
	30.7	WL	Water Level, 10%
	31.5	DE	Debris, 5%
	31.8	WL	Water Level, 5%
	31.8	CN	Connection, 100mm at 10o/c,
	32.4	CN	Connection, 100mm at 12o/c,
	32.4	EL	Encrustation Light, at 7 to 5o/c,
	40.7	CN	Connection, 100mm at 2o/c,
	41.7	CN	Connection, 100mm at 9o/c,
	51.6	CN	Connection, 100mm at 10o/c,
	52.4	CN	Connection, 100mm at 2o/c,
	60.7	CN	Connection, 100mm at 3o/c,
	61.0	WL	Water Level, 10%
	63.4	DE	Debris, 5%
	65.5	DE	Debris, 5%
	65.8	CN	Connection, 100mm at 2o/c,

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Report : ENGLISH Page : 009 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

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7 Plr SQ99449701X Dir DOWNSTREAM Date 15/03/2006 Time 11:00
Location: MAIN STREET , BALLYLONGFORD

---------- Detail (cont.) ----------

	67.5	DE	Debris, 5%
	68.7	MH	Manhole, SQ99449806
8	68.7	FH	Finished Survey,

Report : ENGLISH Page : 010 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
8	USA LTD	USA5878	USA5878	0	0	000	SQ99449806X

Date	Time	Location
15/03/2006	11:17	MAIN STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99449806	0.00	0.000	0.000	SQ99449805	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	100.0	0.8	Z	00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,CROSS ROADS

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	0.80	0.0	0.0	0.0	0.0	1.0	1.0	1.0

Extra Data - Structural override
User remarks Service override

Detail

8	0.0		ST	Start Of Survey,
8	0.0		MH	Manhole, SQ99449806
8	0.0		WL	Water Level, 5%
8	0.0	S1	DE	Debris, 5%
	0.8	F1	DE	Debris, 5%
9	0.8		SA	Survey Abandoned, UNABLE TO PASS DEBRIS

Report : ENGLISH Page : 011 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
9	USA LTD	USA5878	USA5878	0	0	000	SQ99449901X

Date	Time	Location
15/03/2006	12:59	QUAY STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99459001	0.00	0.000	0.000	SQ99449901	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	300	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	82.6	82.6	Z	00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE....	RANDOM SURVEY	?	-

Weather	Location	
DRY	MAIN ROAD - SUB,-	0009

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	80.60	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Service	79.60	3.0	0.0	0.0	0.0	3.0	1.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

9	0.0	ST	Start Of Survey,
9	0.0	MH	Manhole, SQ99459001
9	0.0	WL	Water Level, 5%
	1.6	JN	Junction, 100mm at 3o/c,
	16.0	WL	Water Level, 10%
	18.4	WL	Water Level, 5%
	22.5	CN	Connection, 100mm at 11o/c,
	22.5	EL	Encrustation Light, at 7 to 5o/c,
	38.1	CNI	Connection Intruding, 100mm at 11o/c, Int.20mm
	38.1	EL	Encrustation Light, at 7 to 5o/c,
	43.0	CNI	Connection Intruding, 100mm at 2o/c, Int.10mm
	43.0	EL	Encrustation Light, at 3 to 5o/c,
	43.0	WL	Water Level, 10%
	50.7	JN	Junction, 100mm at 3o/c,
	64.0	WL	Water Level, 15%
	67.0	WL	Water Level, 25%
	70.0	WL	Water Level, 30%
	77.2	WL	Water Level, 40%
	81.0	JN	Junction, 100mm at 9o/c,
	82.6	MH	Manhole, SQ99449901
10	82.6	FH	Finished Survey,

Report : ENGLISH Page : 012 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
10	USA LTD	USA5878	USA5878	0	0	000	SQ99449805X

Date	Time	Location
15/03/2006	13:39	QUAY STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99449901	0.00	0.000	0.000	SQ99449805	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	300	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	100.0	0.1	Z	00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE....	RANDOM SURVEY	?	-

Weather	Location	
DRY	MAIN ROAD - SUB,-	0010

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

10	0.0	ST	Start Of Survey,
10	0.0	MH	Manhole, SQ99449901
10	0.0	WL	Water Level, 20%
10	0.0	GO	General Observation, FLOW METER INSTALLED
11	0.1	SA	Survey Abandoned, UNABLE TO PASS FLOW MONITOR

Report : ENGLISH Page : 013 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
11	USA LTD	USA5878	USA5878	0	0	000	SQ99459001X

Date	Time	Location
15/03/2006	13:48	QUAY STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99459001	0.00	0.000	0.000	SQ99459002	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	300	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	100.0	1.6	Z	00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	1.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	1.60	0.0	0.0	0.0	0.0	5.0	5.0	2.5

Extra Data - Structural override
User remarks Service override

Detail

11	0.0	ST	Start Of Survey,
11	0.0	MH	Manhole, SQ99459001
11	0.0	WL	Water Level, 10%
11	0.0	DE	Debris, 30%
12	1.6	SA	Survey Abandoned, UNABLE TO PASS HANGING DEBRIS

Report : ENGLISH Page : 014 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
12	USA LTD	USA5878	USA5878	0	0	000	SR00450001X

Date	Time	Location
15/03/2006	14:08	QUAY STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SR00450001	0.00	0.000	0.000	SQ99459001	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	76.8	76.8	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

Pre: 0012

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	74.80	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Service	76.80	0.0	0.0	0.0	0.0	2.0	2.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

12	0.0	ST	Start Of Survey,
12	0.0	MH	Manhole, SR00450001
12	0.0	WL	Water Level, 5%
	45.4	CNI	Connection Intruding, 100mm at 3o/c, Int.20mm
	50.8	CNI	Connection Intruding, 100mm at 9o/c, Int.10mm
	65.5	DE	Debris, 10%
	76.8	JN	Junction, 225mm at 6o/c, BACKDROP
	76.8	MH	Manhole, SQ99459001
13	76.8	FH	Finished Survey,

Report : ENGLISH Page : 015 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
13	USA LTD	USA5878	USA5878	0	0	000	SR00450101X

Date	Time	Location
15/03/2006	15:01	QUAY STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SR00450001	0.00	0.000	0.000	SR00450101	0.00	0.000	0.000

Use	Direction	Size	Shape	Material			
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE			
Lining		**Pipe**	**Total**	**Surveyed**	**Laid**		**Video**
NOT SPECIFIED		1.2	84.8	84.8	Z		00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	83.80	0.0	1.0	0.0	0.0	15.0	15.0	0.2
Service	84.80	0.0	0.0	0.0	0.0	34.0	2.0	0.4

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

13	0.0		ST	Start Of Survey,
13	0.0		MH	Manhole, SR00450001
13	0.0		WL	Water Level, 5%
	21.5		JN	Junction, 150mm at 3o/c,
	21.9		FL	Fracture Longitudinal, at 2o/c,
	36.2		DE	Debris, 5%
	49.5	S1	DE	Debris, 5%
	53.9		JN	Junction, 150mm at 9o/c,
	77.7	F1	DE	Debris, 5%
	81.6		JN	Junction, 100mm at 2o/c,
	81.6		DE	Debris, 10%
	82.4		JN	Junction, 100mm at 9o/c,
	83.1		DE	Debris, 20%
	83.6		WL	Water Level, 15%
	84.8		MH	Manhole, SR00450101
14	84.8		FH	Finished Survey,

Report : ENGLISH Page : 016 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
14	USA LTD	USA5878	USA5878	0	0	000	SQ99449803X

Date	Time	Location
15/03/2006	16:01	BRIDGE STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99449803	0.00	0.000	0.000	SQ99449805	0.00	0.000	0.000

Use	Direction	Size	Shape	Material			
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE			
Lining		Pipe	Total	Surveyed	Laid		Video
NOT SPECIFIED		1.2	100.0	1.2	Z		00001

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather	Location	
DRY	MAIN ROAD - SUB,OUTSIDE CENTRA	0014

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

14	0.0	ST	Start Of Survey,
14	0.0	MH	Manhole, SQ99449803
14	0.0	WL	Water Level, 50%
	0.7	CU	Camera Underwater,
15	1.2	SA	Survey Abandoned, UNABLE TO SEE

Report : ENGLISH Page : 017 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
15	USA LTD	USA5878	USA5878	0	0	000	SQ99449802X

Date	Time	Location
15/03/2006	16:16	BRIDGE STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99449803	0.00	0.000	0.000	SQ99449802	0.00	0.000	0.000

Use	Direction	Size	Shape	Material			
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE			
Lining		Pipe	Total	Surveyed	Laid		Video
NOT SPECIFIED		1.2	100.0	0.7	Z		00001

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE....	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,OUTSIDE CENTRA

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	0.00	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Service	0.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

15	0.0	ST	Start Of Survey,
15	0.0	MH	Manhole, SQ99449803
15	0.0	WL	Water Level, 50%
	0.7	CNI	Connection Intruding, 150mm at 2o/c, Int.40mm
16	0.7	SA	Survey Abandoned, UNABLE TO PASS CONNECTION

Report : ENGLISH Page : 018 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
16	USA LTD	USA5878	USA5878	0	0	000	SQ99453404X

Date 30/03/2006 Time 15:26 Location RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99453401	0.00	0.000	0.000	SQ99453404	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	20.2	20.2	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE....	RANDOM SURVEY	?	-

Weather DRY Location MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	17.20	0.0	1.0	2.0	0.0	8.0	8.0	0.4
Service	20.20	0.0	0.0	0.0	0.0	8.0	3.0	0.4

Extra Data - Structural override
User remarks Service override

Detail

1	0.0		ST	Start Of Survey,
1	0.0		MH	Manhole, SQ99453401
1	0.0		WL	Water Level, 30%
	1.7		H	Hole, at 1o/c,
	5.0	S1	DEG	Debris Grease, at 9 to 3o/c, 5%
	6.1		WL	Water Level, 20%
	7.8		WL	Water Level, 30%
	9.9		WL	Water Level, 50%
	10.0	F1	DEG	Debris Grease, at 9 to 3o/c, 5%
	10.6		RFJ	Roots Fine At Joint, at 11 to 12o/c,
	10.9		CNI	Connection Intruding, 100mm at 10o/c, Int.15mm
	10.9		FC	Fracture Circumferential, at 12 to 3o/c,
	10.9		RF	Roots Fine, at 12 to 2o/c,
	11.2		CU	Camera Underwater,
	11.2		WL	Water Level, 60%
	11.8		WL	Water Level, 40%
	12.6		GO	General Observation, CHIPPED JOINT
	15.9		WL	Water Level, 40%
	18.4		WL	Water Level, 50%
	20.2		GO	General Observation, WRONG REF ON VIDEO
	20.2		MH	Manhole, SQ99453404
2	20.2		FH	Finished Survey,

Report : ENGLISH Page : 019 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
17	USA LTD PC	USA5878	USA5878	0	0	000	SQ99453403X

Date	Time	Location
30/03/2006	15:37	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99453401	0.00	0.000	0.000	SQ99453403	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	48.7	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	46.70	0.0	1.0	1.0	0.0	9.6	8.0	0.2
Service	45.70	2.0	0.0	1.0	0.0	10.0	3.0	0.2

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

2	0.0	ST	Start Of Survey,
2	0.0	MH	Manhole, SQ99453401
2	0.0	WL	Water Level, 5%
	1.6	WL	Water Level, 10%
	3.3	WL	Water Level, 20%
	6.1	WL	Water Level, 10%
	6.8	WL	Water Level, 20%
	13.3	WL	Water Level, 30%
	16.4	ELJ	Encrustation Light At Joint, at 2 to 5o/c,
	17.0	WL	Water Level, 5%
	19.2	DES	Debris Silt, 5%
	21.5	DES	Debris Silt, 5%
	21.5	WL	Water Level, 15%
	22.3	DES	Debris Silt, 5%
	23.0	JN	Junction, 100mm at 2o/c,
	23.0	GO	General Observation, WATER FLOWING FROM JN
	25.2	WL	Water Level, 5%
	25.8	CX	Connection Defective, 100mm at 10o/c,
	25.8	EMJ	Encrustation Medium At Joint, at 9 to 10o/c, 10%
	26.5	WL	Water Level, 15%
	28.6	WL	Water Level, 5%
	29.4	FC	Fracture Circumferential, at 6 to 10o/c,
	31.0	WL	Water Level, 10%
	32.0	WL	Water Level, 20%
	33.0	WL	Water Level, 30%
	33.0 S1	JDS	Joint Displaced Slight,
	35.0	WL	Water Level, 10%
	35.0	DEG	Debris Grease, at 7 to 8o/c, 5%
	35.0	DEG	Debris Grease, at 4 to 5o/c, 5%
	35.6	DES	Debris Silt, 5%

---------- continued..----

17 Plr SQ99453403X Dir UPSTREAM Date 30/03/2006 Time 15:37
Location: RUSHEEN PARK EST , BALLYLONGFORD

---------- Detail (cont.) ----------

	39.6		WL	Water Level, 5%
	40.1		CN	Connection, 100mm at 10o/c,
	40.1		WL	Water Level, 5%
	43.3		WL	Water Level, 10%
	45.0		ELJ	Encrustation Light At Joint, at 4 to 5o/c,
	45.5		JN	Junction, 100mm at 3o/c,
	45.5		GO	General Observation,
				WATER FLOWING FROM JNC
	46.6		WL	Water Level, 20%
	47.8		WL	Water Level, 50%
	48.7	F1	JDS	Joint Displaced Slight,
3	48.7		SA	Survey Abandoned,
				DISPLACED JOINT

Report : ENGLISH Page : 021 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
18	USA LTD PC	USA5878	USA5878	0	0	000	SQ99453401X

Date	Time	Location
30/03/2006	15:56	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99453401	0.00	0.000	0.000	SQ99453402	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	30.5	30.5	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	16.50	8.0	5.0	1.0	0.0	68.1	23.0	2.2
Service	28.50	1.0	0.0	0.0	1.0	13.0	2.0	0.4

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

3	0.0	ST	Start Of Survey,
3	0.0	MH	Manhole, SQ99453401
3	0.0	WL	Water Level, 10%
	0.7	OJS	Open Joint Slight,
	0.8	CL	Crack Longitudinal, at 9o/c,
	0.9	CXI	Connection Defective/Intruding, 100mm at 8o/c, Int.5mm
	1.3	FC	Fracture Circumferential, at 11 to 5o/c,
	1.3	CL	Crack Longitudinal, at 9o/c,
	1.8	CL	Crack Longitudinal, at 10o/c,
	1.8	CC	Crack Circumferential, at 7 to 2o/c,
	7.3	ISJ	Infiltration Seeper At Joint, at 3 to 5o/c,
	8.0	RFJ	Roots Fine At Joint,
	8.7	RF	Roots Fine, AT CONNECTION
	8.7	CN	Connection, 100mm at 11o/c,
	12.7	FL	Fracture Longitudinal, at 8o/c,
	12.7	FC	Fracture Circumferential, at 1 to 5o/c,
	16.6	CC	Crack Circumferential, at 12 to 12o/c,
	16.6	CL	Crack Longitudinal, at 1o/c,
	18.2	RMJ	Roots Mass At Joint, 15%
	18.2	FC	Fracture Circumferential, at 7 to 4o/c,
	18.2	FL	Fracture Longitudinal, at 11o/c,
	19.3	JDM	Joint Displaced Medium,
	19.3	RFJ	Roots Fine At Joint,
	23.6	JDM	Joint Displaced Medium,
	23.6	CC	Crack Circumferential, at 9 to 11o/c,
	27.6 S1	DEG	Debris Grease, at 7 to 8o/c, 5%
	27.6 S2	DEG	Debris Grease, at 4 to 5o/c, 5%
	28.5	CL	Crack Longitudinal, at 11o/c,
	30.5 F1	DEG	Debris Grease, at 7 to 8o/c, 5%
	30.5 F2	DEG	Debris Grease, at 4 to 5o/c, 5%

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18 Plr SQ99453401X Dir DOWNSTREAM Date 30/03/2006 Time 15:56
Location: RUSHEEN PARK EST , BALLYLONGFORD

Detail (cont.)

	30.5	MH	Manhole, SQ99453402
4	30.5	FH	Finished Survey,

Report : ENGLISH Page : 023 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
19	USA LTD PC	USA5878	USA5878	0	0	000	SQ99453405X

Date	Time	Location
30/03/2006	16:14	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99453405	0.00	0.000	0.000	SQ99453403	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	1.0	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	1.00	0.0	0.0	0.0	0.0	2.0	2.0	1.0

Extra Data - Structural override
User remarks Service override

Detail

4	0.0	ST	Start Of Survey,
4	0.0	MH	Manhole, SQ99453405
4	0.0	WL	Water Level, 25%
4	0.0	GO	General Observation, ST MH CHANGED FROM 2401
	0.6	DE	Debris, 20%
5	1.0	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 024 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
20	USA LTD PC	USA5878	USA5878	0	0	000	SQ99453501X

Date Time Location
30/03/2006 16:31 RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99453501	0.00	0.000	0.000	SQ99453502	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	48.5	48.5	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather Location
DRY MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	43.50	1.0	3.0	1.0	0.0	34.0	31.0	0.7
Service	46.50	1.0	0.0	0.0	1.0	17.0	10.0	0.3

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

5	0.0	ST	Start Of Survey,
5	0.0	MH	Manhole, SQ99453501
5	0.0	WL	Water Level, 10%
	0.6	RFJ	Roots Fine At Joint,
	2.8	RFJ	Roots Fine At Joint,
	3.9	RFJ	Roots Fine At Joint,
	5.0	CL	Crack Longitudinal, at 9o/c,
	8.6	GO	General Observation, CHIPPED JOINT
	9.8	RF	Roots Fine,
	9.9	RFJ	Roots Fine At Joint,
	9.9	CNI	Connection Intruding, 100mm at 12o/c, Int.40mm
	10.9	RFJ	Roots Fine At Joint,
	13.7	WL	Water Level, 30%
	14.2	JDM	Joint Displaced Medium,
	14.2	IGJ	Infiltration Gusher At Joint, at 7 to 8o/c,
	15.7	WL	Water Level, 15%
	16.8	JDM	Joint Displaced Medium,
	17.1	JN	Junction, 100mm at 1o/c,
	28.0	FC	Fracture Circumferential, at 12 to 4o/c,
	28.0	FL	Fracture Longitudinal, at 12o/c,
	28.3	FC	Fracture Circumferential, at 12 to 4o/c,
	28.6	RFJ	Roots Fine At Joint,
	37.1	WL	Water Level, 20%
	39.5	OB	Obstruction, 25%
	40.4	WL	Water Level, 10%
	41.2	JN	Junction, 100mm at 1o/c,
	41.2	WL	Water Level, 15%
	45.1	WL	Water Level, 10%
	48.5	GO	General Observation, WRONG REF IN VIDEO

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Report : ENGLISH Page : 025 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

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20 Plr SQ99453501X Dir DOWNSTREAM Date 30/03/2006 Time 16:31
Location: RUSHEEN PARK EST , BALLYLONGFORD

---------- Detail (cont.) ----------

	48.5	MH	Manhole, SQ99453502
6	48.5	FH	Finished Survey,

Report : ENGLISH Page : 026 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
21	USA LTD PC	USA5878	USA5878	0	0	000	SQ99453502X

Date	Time	Location
30/03/2006	16:37	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99453502	0.00	0.000	0.000	SQ99453404	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	2.0	45.3	45.1	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	41.10	0.0	2.0	1.0	1.0	150.0	125.0	3.3
Service	44.10	0.0	0.0	1.0	0.0	4.0	1.0	0.1

Extra Data - Structural override
User remarks Service override

Detail

6	0.0	ST	Start Of Survey,
6	0.0	MH	Manhole, SQ99453502
6	0.0	WL	Water Level, 10%
6	0.0	DES	Debris Silt, 5%
	1.7	RFJ	Roots Fine At Joint,
	6.3	JDM	Joint Displaced Medium,
	9.9	RFJ	Roots Fine At Joint,
	13.5	JDM	Joint Displaced Medium,
	15.4	RFJ	Roots Fine At Joint,
	17.0	JDM	Joint Displaced Medium,
	22.9	CNI	Connection Intruding, 100mm at 2o/c, Int.25mm
	22.9	IRJ	Infiltration Runner At Joint, at 3o/c,
	28.8	JDM	Joint Displaced Medium,
	44.8	D	Deformed Pipe, 25%
	45.1	FC	Fracture Circumferential, at 9 to 2o/c,
	45.1	FL	Fracture Longitudinal, at 9o/c,
7	45.1	SA	Survey Abandoned, DUE TO DEFORMED PIPE

Report : ENGLISH Page : 027 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
22	USA LTD PC	USA5878	USA5878	0	0	000	SQ9945____X

Date	Time	Location
24/04/2006	11:48	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99453501	0.00	0.000	0.000	SQ9945____	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	100.0	11.3	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	11.30	0.0	0.0	0.0	0.0	6.0	0.5	0.5
Service	11.30	0.0	0.0	0.0	0.0	5.0	5.0	0.4

Extra Data - Structural override
User remarks Service override

Detail

7	0.0	ST	Start Of Survey,
7	0.0	MH	Manhole, SQ99453501
7	0.0	WL	Water Level, 20%
	0.6 S1	JDM	Joint Displaced Medium,
	1.3	WL	Water Level, 30%
	6.5	WL	Water Level, 20%
	11.3 F1	JDM	Joint Displaced Medium,
	11.3	WL	Water Level, 10%
	11.3	DE	Debris, 30%
8	11.3	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 028 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
23	USA LTD PC	USA5878	USA5878	0	0	000	SQ99453402X

Date	Time	Location
30/03/2006	17:44	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454401	0.00	0.000	0.000	SQ99453402	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	150	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.2	25.1	25.1	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	25.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	25.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

8	0.0		ST	Start Of Survey,
8	0.0		MH	Manhole, SQ99454401
8	0.0		WL	Water Level, 10%
	2.3		WL	Water Level, 20%
	3.4		WL	Water Level, 40%
	3.4	S1	CU	Camera Underwater,
	25.1	F1	CU	Camera Underwater,
	25.1		MH	Manhole, SQ99453402
9	25.1		FH	Finished Survey,

Report : ENGLISH Page : 029 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
24	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454406X

Date Time Location
30/03/2006 17:59 RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454401	0.00	0.000	0.000	SQ99454406	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	150	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	18.4	18.4	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather Location
DRY MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	14.40	0.0	0.0	0.0	4.0	180.0	90.0	9.5
Service	18.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

9	0.0	ST	Start Of Survey,
9	0.0	MH	Manhole, SQ99454401
9	0.0	WL	Water Level, 5%
	2.9	D	Deformed Pipe, 10%
	5.0	D	Deformed Pipe, 10%
	6.6	WL	Water Level, 10%
	11.0	WL	Water Level, 30%
	12.0	D	Deformed Pipe, 10%
	12.0	WL	Water Level, 40%
	13.1	WL	Water Level, 50%
	15.2	GO	General Observation, DIRT ON CAMERA
	15.2	GO	General Observation, VIEW HINDERED
	16.2	D	Deformed Pipe, 20%
	18.4	MH	Manhole, SQ99454406
10	18.4	FH	Finished Survey,

Report : ENGLISH Page : 030 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
25	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454401X

Date	Time	Location
30/03/2006	20:27	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454401	0.00	0.000	0.000	SQ99454303	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	22.9	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	17.90	0.0	0.0	5.0	0.0	0.0	0.0	0.0
Service	19.90	0.0	0.0	2.0	1.0	5.0	5.0	0.2

Extra Data - Structural override
User remarks Service override

Detail

10	0.0	ST	Start Of Survey,
10	0.0	MH	Manhole, SQ99454401
10	0.0	WL	Water Level, 5%
	1.8	JN	Junction, 100mm at 11o/c,
	4.9	CX	Connection Defective, 100mm at 12o/c,
	13.1	CXI	Connection Defective/Intruding, 100mm at 2o/c, Int.50mm
	13.8	CX	Connection Defective, 100mm at 11o/c,
	14.4	CX	Connection Defective, 100mm at 12o/c,
	14.4	IRJ	Infiltration Runner At Joint, at 11o/c,
	14.4	IRJ	Infiltration Runner At Joint, at 1o/c,
	18.9	CN	Connection, 100mm at 12o/c,
	19.7	JN	Junction, 100mm at 10o/c,
	22.9	CX	Connection Defective, 100mm at 1o/c,
	22.9	EH	Encrustation Heavy, at 1 to 5o/c, 30%
11	22.9	SA	Survey Abandoned, DUE TO OBSTRUCTION

Report : ENGLISH Page : 031 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
26	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454204X

Date	Time	Location
30/03/2006	21:13	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454202	0.00	0.000	0.000	SQ99454204	0.00	0.000	0.000

Use	Direction	Size	Shape	Material			
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE			
Lining		**Pipe**	**Total**	**Surveyed**	**Laid**		**Video**
NOT SPECIFIED		1.0	30.3	30.3	Z		00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	30.30	0.0	0.0	0.0	0.0	15.5	1.0	0.5
Service	30.30	0.0	0.0	0.0	0.0	2.0	2.0	0.1

Extra Data - Structural override
User remarks Service override

Detail

11	0.0		ST	Start Of Survey,
11	0.0		MH	Manhole, SQ99454202
11	0.0		WL	Water Level, 10%
	0.8		JN	Junction, 100mm at 11o/c,
	2.2	S1	JDM	Joint Displaced Medium,
	3.7		JN	Junction, 100mm at 11o/c,
	8.5		OJM	Open Joint Medium,
	16.8		OJM	Open Joint Medium,
	27.0		DE	Debris, 20%
	27.0		WL	Water Level, 20%
	28.5		JN	Junction, 100mm at 2o/c,
	30.3	F1	JDM	Joint Displaced Medium,
	30.3		MH	Manhole, SQ99454204
12	30.3		FH	Finished Survey,

Report : ENGLISH Page : 032 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
27	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454202X

Date	Time	Location
30/03/2006	21:25	RUSHEEN PARK EST , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454202	0.00	0.000	0.000	SQ99454201	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	VITRIFIED CLAY

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	48.2	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	48.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	45.20	3.0	0.0	0.0	0.0	2.0	1.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

12	0.0	ST	Start Of Survey,
12	0.0	MH	Manhole, SQ99454202
12	0.0	WL	Water Level, 10%
	1.9	ISJ	Infiltration Seeper At Joint, at 8 to 10o/c,
	1.9	ELJ	Encrustation Light At Joint, at 1 to 11o/c,
	38.0	ELJ	Encrustation Light At Joint, at 5 to 8o/c,
	44.1	WL	Water Level, 20%
	44.7	WL	Water Level, 30%
	45.3	WL	Water Level, 50%
	48.2	CU	Camera Underwater,
13	48.2	SA	Survey Abandoned, DUE TO CAMERA UNDERWATER

Report : ENGLISH Page : 033 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
28	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454303X

Date	Time	Location
30/03/2006	21:51	GLEBE HOUSE , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454303	0.00	0.000	0.000	SQ99454204	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	10.0	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	10.00	0.0	0.0	0.0	0.0	0.8	0.1	0.1
Service	8.00	0.0	0.0	1.0	1.0	5.0	5.0	0.5

Extra Data - Structural override
User remarks Service override

Detail

13	0.0		ST	Start Of Survey,
13	0.0		MH	Manhole, SQ99454303
13	0.0		WL	Water Level, 10%
	3.8		JN	Junction, 100mm at 2o/c,
	3.8	S1	JDS	Joint Displaced Slight,
	10.0		EHJ	Encrustation Heavy At Joint, at 7 to 5o/c, 40%
	10.0		IRJ	Infiltration Runner At Joint, at 1 to 2o/c,
	10.0	F1	JDS	Joint Displaced Slight,
14	10.0		SA	Survey Abandoned, DUE TO ENCRUSTATION

Report : ENGLISH Page : 034 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
29	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454201X

Date	Time	Location
05/04/2006	11:30	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454101	0.00	0.000	0.000	SQ99454201	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	71.8	71.8	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	71.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	71.80	0.0	0.0	0.0	0.0	15.0	2.0	0.2

Extra Data - Structural override
User remarks Service override

Detail

14	0.0	ST	Start Of Survey,
14	0.0	MH	Manhole, SQ99454101
14	0.0	WL	Water Level, 30%
	27.8	WL	Water Level, 10%
	43.0	DE	Debris, 20%
	43.3	WL	Water Level, 30%
	51.6	WL	Water Level, 20%
	58.3	JN	Junction, 100mm at 9o/c,
	60.4	WL	Water Level, 10%
	62.1	DES	Debris Silt, 5%
	66.9 S1	DE	Debris, 10%
	71.8 F1	DE	Debris, 10%
15	71.8	MH	Manhole, SQ99454201
15	71.8	FH	Finished Survey,

Report : ENGLISH Page : 035 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
30	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454101X

Date	Time	Location
05/04/2006	11:52	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99454101	0.00	0.000	0.000	SQ99454102	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	0.8	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	0.80	0.0	0.0	0.0	0.0	2.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

15	0.0	ST	Start Of Survey,
15	0.0	MH	Manhole, SQ99454101
15	0.0	WL	Water Level, 20%
	0.7	DE	Debris, 10%
16	0.8	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 036 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
31	USA LTD PC	USA5878	USA5878	0	0	000	SQ99454102X

Date	Time	Location
05/04/2006	12:11	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99455001	0.00	0.000	0.000	SQ99454102	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	1.2	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	1.20	0.0	0.0	0.0	0.0	2.0	2.0	1.0

Extra Data - Structural override
User remarks Service override

Detail

16	0.0	ST	Start Of Survey,
16	0.0	MH	Manhole, SQ99455001
16	0.0	WL	Water Level, 20%
	0.8	DE	Debris, 20%
17	1.2	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 037 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
32	USA LTD PC	USA5878	USA5878	0	0	000	SQ99455001X

Date	Time	Location
05/04/2006	12:14	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99455001	0.00	0.000	0.000	SQ99456004	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	4.0	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	4.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	4.00	0.0	0.0	0.0	0.0	1.0	1.0	0.2

Extra Data - Structural override
User remarks Service override

Detail

17	0.0	ST	Start Of Survey,
17	0.0	MH	Manhole, SQ99455001
17	0.0	WL	Water Level, 30%
	4.0	DE	Debris, 5%
18	4.0	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 038 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
33	USA LTD PC	USA5878	USA5878	0	0	000	SQ99447801X

Date	Time	Location
05/04/2006	14:33	BRIDGE STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99447901	0.00	0.000	0.000	SQ99447801	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	4.8	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	4.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	4.80	0.0	0.0	0.0	0.0	2.0	2.0	0.4

Extra Data - Structural override
User remarks Service override

Detail

18	0.0	ST	Start Of Survey,
18	0.0	MH	Manhole, SQ99447901
18	0.0	WL	Water Level, 20%
	3.8	DE	Debris, 10%
19	4.8	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 039 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
34	USA LTD PC	USA5878	USA5878	0	0	000	SQ99447901X

Date	Time	Location
05/04/2006	14:41	BRIDGE STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99447901	0.00	0.000	0.000	SQ99457001	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	45.4	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	45.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	43.40	1.0	0.0	1.0	0.0	25.0	2.0	0.5

Extra Data - Structural override
User remarks Service override

Detail

19	0.0	ST	Start Of Survey,
19	0.0	MH	Manhole, SQ99447901
19	0.0	WL	Water Level, 10%
	0.8 S1	DE	Debris, 10%
	2.6	JN	Junction, 100mm at 10o/c,
	6.0 F1	DE	Debris, 10%
	12.6	DE	Debris, 5%
	17.6	DE	Debris, 5%
	23.7	DE	Debris, 5%
	27.1	DE	Debris, 5%
	27.5	ELJ	Encrustation Light At Joint, at 7 to 10o/c,
	28.0	EMJ	Encrustation Medium At Joint, at 12 to 11o/c, 10%
	28.0	JN	Junction, 100mm at 12o/c,
	31.4	JN	Junction, 100mm at 11o/c,
	39.5	JN	Junction, 100mm at 11o/c,
	41.6	DE	Debris, 10%
	45.4	DE	Debris, 10%
20	45.4	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 040 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
35	USA LTD PC	USA5878	USA5878	0	0	000	SQ99448802X

Date	Time	Location
05/04/2006	15:02	BRIDGE STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99448802	0.00	0.000	0.000	SQ99447801	0.00	0.000	0.000

Use	Direction	Size	Shape	Material			
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE			
Lining		Pipe	Total	Surveyed	Laid		Video
NOT SPECIFIED		1.0	100.0	1.3	Z		00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	1.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	1.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

20	0.0	ST	Start Of Survey,
20	0.0	MH	Manhole, SQ99448802
20	0.0	WL	Water Level, 40%
21	1.3	SA	Survey Abandoned, DUE TO HIGH WATER

Report : ENGLISH Page : 041 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
36	USA LTD PC	USA5878	USA5878	0	0	000	SQ99457001X

Date	Time	Location
05/04/2006	15:15	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456004	0.00	0.000	0.000	SQ99457001	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	66.6	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	65.60	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Service	60.60	5.0	0.0	1.0	0.0	80.0	5.0	1.2

Extra Data - Structural override
User remarks Service override

Detail

21	0.0		ST	Start Of Survey,
21	0.0		MH	Manhole, SQ99456004
21	0.0		WL	Water Level, 10%
21	0.0	S1	DES	Debris Silt, 5%
	2.3		DE	Debris, 10%
	10.0		DE	Debris, 10%
	22.1		DE	Debris, 10%
	25.0		IDJ	Infiltration Dripper At Joint, at 10 to 11o/c,
	25.2		WL	Water Level, 20%
	34.6		ELJ	Encrustation Light At Joint, at 3 to 5o/c,
	39.1		EMJ	Encrustation Medium At Joint, at 1 to 12o/c, 10%
	39.1		IDJ	Infiltration Dripper At Joint, at 12 to 1o/c,
	39.9		JN	Junction, 100mm at 10o/c,
	39.9		ELJ	Encrustation Light At Joint, at 7 to 10o/c,
	39.9		ELJ	Encrustation Light At Joint, at 7 to 12o/c,
	39.9		JN	Junction, 100mm at 12o/c,
	46.8		WL	Water Level, 10%
	58.4		DE	Debris, 10%
	66.6		CXI	Connection Defective/Intruding, 100mm at 12o/c, Int.80mm
	66.6	F1	DES	Debris Silt, 5%
22	66.6		SA	Survey Abandoned, DUE TO INTRUSION

Report : ENGLISH Page : 042 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
37	USA LTD PC	USA5878	USA5878	0	0	000	SQ99455001X

Date	Time	Location
05/04/2006	15:35	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456004	0.00	0.000	0.000	SQ99455001	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	2.1	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	2.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	1.10	0.0	0.0	0.0	1.0	10.0	6.0	3.3

Extra Data - Structural override
User remarks Service override

Detail

22	0.0	ST	Start Of Survey,
22	0.0	MH	Manhole, SQ99456004
22	0.0	WL	Water Level, 20%
	0.8	EHJ	Encrustation Heavy At Joint, at 7 to 12o/c, 25%
	0.8 S1	DES	Debris Silt, 5%
	2.1	DE	Debris, 20%
	2.1 F1	DES	Debris Silt, 5%
23	2.1	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 043 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
38	USA LTD PC	USA5878	USA5878	0	0	000	SQ99456004X

Date	Time	Location
05/04/2006	15:41	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456004	0.00	0.000	0.000	SQ99456006	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	300	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	0.8	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	0.00	0.0	0.0	1.0	0.0	2.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

23	0.0	ST	Start Of Survey,
23	0.0	MH	Manhole, SQ99456004
23	0.0	WL	Water Level, 20%
	0.8	EMJ	Encrustation Medium At Joint, at 9 to 11o/c, 10%
24	0.8	SA	Survey Abandoned, CANNOT PASS OBSTRUCTION

Report : ENGLISH Page : 044 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
39	USA LTD PC	USA5878	USA5878	0	0	000	SQ99456006X

Date	Time	Location
05/04/2006	16:00	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456006	0.00	0.000	0.000	SQ99456007	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	300	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	21.2	21.2	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	21.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	21.20	0.0	0.0	0.0	0.0	24.0	3.0	1.1

Extra Data - Structural override
User remarks Service override

Detail

1	0.0		ST	Start Of Survey,
1	0.0		MH	Manhole, SQ99456006
1	0.0		WL	Water Level, 15%
1	0.0	S1	DES	Debris Silt, 5%
	12.6		DE	Debris, 10%
	21.2	F1	DES	Debris Silt, 5%
	21.2		MH	Manhole, SQ99456007
2	21.2		FH	Finished Survey,

Report : ENGLISH Page : 045 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
40	USA LTD PC	USA5878	USA5878	0	0	000	SQ99456007X

Date	Time	Location
06/04/2006	17:12	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456007	0.00	0.000	0.000	SQ99456103	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	300	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	27.2	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	27.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	27.20	0.0	0.0	0.0	0.0	30.0	3.0	1.1

Extra Data - Structural override
User remarks Service override

Detail

2	0.0		ST	Start Of Survey,
2	0.0		MH	Manhole, SQ99456007
2	0.0		WL	Water Level, 20%
2	0.0	S1	DES	Debris Silt, 5%
	1.2		DE	Debris, 20%
	9.2		WL	Water Level, 10%
	15.4		WL	Water Level, 20%
	20.0		WL	Water Level, 30%
	22.0		WL	Water Level, 40%
	27.2	F1	DES	Debris Silt, 5%
3	27.2		SA	Survey Abandoned, VIEW HINDERED BY HIGH WATER

Report : ENGLISH Page : 046 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
41	USA LTD PC	USA5878	USA5878	0	0	000	SQ99456008X

Date	Time	Location
06/04/2006	17:34	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456008	0.00	0.000	0.000	SQ99456101	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	300	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	10.2	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	10.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	10.20	0.0	0.0	0.0	0.0	5.0	5.0	0.5

Extra Data - Structural override
User remarks Service override

Detail

3	0.0	ST	Start Of Survey,
3	0.0	MH	Manhole, SQ99456008
3	0.0	WL	Water Level, 50%
	3.4	DE	Debris, 70% PLASTIC
	7.0	WL	Water Level, 60%
	7.6	CU	Camera Underwater,
	10.2	WL	Water Level, 50%
4	10.2	SA	Survey Abandoned, DUE TO HIGH WATER

Report : ENGLISH Page : 047 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
42	USA LTD PC	USA5878	USA5878	0	0	000	SQ99456001X

Date	Time	Location
06/04/2006	18:00	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456001	0.00	0.000	0.000	SQ99455002	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	200	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	0.6	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	0.60	0.0	0.0	0.0	0.0	5.0	5.0	5.0

Extra Data - Structural override
User remarks Service override

Detail

4	0.0	ST	Start Of Survey,
4	0.0	MH	Manhole, SQ99456001
4	0.0	WL	Water Level, 30%
	0.6	DE	Debris, 30%
5	0.6	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 048 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
43	USA LTD PC	USA5878	USA5878	0	0	000	SQ99456001X

Date	Time	Location
06/04/2006	18:02	BALLYBUNION ROAD , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99456001	0.00	0.000	0.000	SQ99455002	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	200	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	32.2	32.2	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	32.20	0.0	0.0	0.0	0.0	0.2	0.1	0.0
Service	32.20	0.0	0.0	0.0	0.0	12.0	1.0	0.4

Extra Data - Structural override
User remarks Service override

Detail

5	0.0	ST	Start Of Survey,
5	0.0	MH	Manhole, SQ99456001
5	0.0	WL	Water Level, 5%
	6.0	GO	General Observation, CHIPPED JOINT
	16.8	WL	Water Level, 10%
	17.5	WL	Water Level, 20%
	18.0	WL	Water Level, 30%
	19.0	WL	Water Level, 10%
	19.0 S1	DES	Debris Silt, 5%
	21.0	WL	Water Level, 5%
	30.5 F1	DES	Debris Silt, 5%
	30.5	LL	Line Left,
	30.5	MC	Material Change, CONCRETE
	31.1	JDS	Joint Displaced Slight,
	32.2	JDS	Joint Displaced Slight,
6	32.2	MH	Manhole, SQ99455002
6	32.2	FH	Finished Survey,

Report : ENGLISH Page : 049 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
44	USA LTD PC	USA5878	USA5878	0	0	000	SR00442703X

Date	Time	Location
06/04/2006	18:52	WELL STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SR00441701	0.00	0.000	0.000	SR00442703	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	7.5	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	7.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	7.50	0.0	0.0	0.0	0.0	9.0	3.0	1.1

Extra Data - Structural override
User remarks Service override

Detail

6	0.0	ST	Start Of Survey,
6	0.0	MH	Manhole, SR00441701
6	0.0	WL	Water Level, 10%
	1.1	DE	Debris, 10%
	4.4	DE	Debris, 10%
	6.3	DE	Debris, 10%
	7.2	DE	Debris, 20%
	7.2	RFJ	Roots Fine At Joint,
7	7.5	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 050 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
45	USA LTD PC	USA5878	USA5878	0	0	000	SR00441701X

Date	Time	Location
06/04/2006	09:22	WELL STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SR00441701	0.00	0.000	0.000	SR00440801	0.00	0.000	0.000

Use	Direction	Size	Shape	Material			
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE			
Lining		Pipe	Total	Surveyed	Laid		Video
NOT SPECIFIED		1.0	100.0	60.9	Z		00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	54.90	6.0	0.0	0.0	0.0	10.1	3.0	0.2
Service	57.90	2.0	0.0	0.0	1.0	18.0	5.0	0.3

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

7	0.0	ST	Start Of Survey,
7	0.0	MH	Manhole, SR00441701
7	0.0	WL	Water Level, 10%
	1.6	EHJ	Encrustation Heavy At Joint, at 11 to 5o/c, 25%
	4.4	DE	Debris, 5%
	14.6	CN	Connection, 100mm at 9o/c,
	19.1	CC	Crack Circumferential, at 11 to 2o/c,
	19.4	DE	Debris, 5%
	19.4	CN	Connection, 100mm at 3o/c,
	20.4	DE	Debris, 10%
	20.7 S1	JDS	Joint Displaced Slight,
	25.7 F1	JDS	Joint Displaced Slight,
	25.7	CN	Connection, 100mm at 9o/c,
	39.0	OJM	Open Joint Medium,
	40.3	DE	Debris, 5%
	40.9	CL	Crack Longitudinal, at 12o/c,
	40.9	GO	General Observation, CHIPPED JOINT
	43.0	CN	Connection, 100mm at 3o/c,
	44.4	ELJ	Encrustation Light At Joint, at 7 to 10o/c,
	47.4	CN	Connection, 100mm at 9o/c,
	48.3	WL	Water Level, 15%
	49.5	DE	Debris, 10%
	49.8	ELJ	Encrustation Light At Joint, at 1 to 12o/c,
	50.5	DE	Debris, 15%
	51.3	WL	Water Level, 5%
	53.1	CN	Connection, 100mm at 12o/c,
	55.6	CL	Crack Longitudinal, at 9o/c,
	55.6	CC	Crack Circumferential, at 11 to 2o/c,
	55.6	GO	General Observation, CHIPPED JOINT

---------- continued...----

Report : ENGLISH Page : 051 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

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45 Plr SR00441701X Dir DOWNSTREAM Date 06/04/2006 Time 09:22
Location: WELL STREET , BALLYLONGFORD

---------- Detail (cont.) ----------

	56.0	CN	Connection, 100mm at 3o/c,
	60.1	CC	Crack Circumferential, at 10 to 11o/c,
	60.1	CL	Crack Longitudinal, at 11o/c,
	60.1	WL	Water Level, 15%
	60.9	DE	Debris, 15%
8	60.9	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 052 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
46	USA LTD PC	USA5878	USA5878	0	0	000	SR00443705X

Date	Time	Location
06/04/2006	19:31	WELL STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SR00443705	0.00	0.000	0.000	SR00442703	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	0.9	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	0.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	0.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

8	0.0	ST	Start Of Survey,
8	0.0	MH	Manhole, SR00443705
8	0.0	WL	Water Level, 50%
9	0.9	SA	Survey Abandoned, DUE HIGH WATER

Report : ENGLISH Page : 053 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
47	USA LTD PC	USA5878	USA5878	0	0	000	SR00440801X

Date	Time	Location
06/04/2006	19:46	WELL STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SR00440802	0.00	0.000	0.000	SR00440801	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	15.0	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	15.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	15.00	0.0	0.0	0.0	0.0	8.0	2.0	0.5

Extra Data - Structural override
User remarks Service override

Detail

9	0.0	ST	Start Of Survey,
9	0.0	MH	Manhole, SR00440802
9	0.0	WL	Water Level, 5%
	0.8	DE	Debris, 20%
	8.5	CN	Connection, 100mm at 9o/c,
	12.5	DE	Debris, 20%
	14.4	DE	Debris, 20%
	15.0	CN	Connection, 100mm at 3o/c,
	15.0	DE	Debris, 20%
10	15.0	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 054 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
48	USA LTD PC	USA5878	USA5878	0	0	000	SR00440802X

Date Time Location
06/04/2006 19:52 WELL STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SR00440802	0.00	0.000	0.000	SQ99449809	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	43.7	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
PHILLIPS	NONE...	RANDOM SURVEY	?	-

Weather Location
DRY MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	32.70	10.0	0.0	1.0	0.0	15.0	4.0	0.3
Service	41.70	1.0	0.0	1.0	0.0	21.0	5.0	0.5

Extra Data - Structural override
User remarks Service override

---------- Detail ----------

10	0.0	ST	Start Of Survey,
10	0.0	MH	Manhole, SR00440802
10	0.0	WL	Water Level, 10%
	0.7	CC	Crack Circumferential, at 11 to 2o/c,
	1.7	CN	Connection, 100mm at 9o/c,
	2.4	DE	Debris, 5%
	2.4	CC	Crack Circumferential, at 11 to 1o/c,
	2.4	CL	Crack Longitudinal, at 12o/c,
	3.1	DE	Debris, 5%
	5.4	CN	Connection, 100mm at 9o/c,
	6.9	DE	Debris, 5%
	9.0	CN	Connection, 100mm at 3o/c,
	10.4	DE	Debris, 5%
	12.3	CC	Crack Circumferential, at 12 to 3o/c,
	14.3	CC	Crack Circumferential, at 9 to 3o/c,
	14.3	CN	Connection, 100mm at 9o/c,
	19.5	CL	Crack Longitudinal, at 9o/c,
	20.9	DE	Debris, 5%
	22.7	CN	Connection, 100mm at 3o/c,
	23.4	CN	Connection, 100mm at 2o/c,
	26.0	CN	Connection, 100mm at 9o/c,
	26.0	DE	Debris, 20%
	27.6	CL	Crack Longitudinal, at 10o/c,
	27.6	CC	Crack Circumferential, at 10 to 1o/c,
	27.6	DE	Debris, 20%
	29.0	DE	Debris, 20%
	31.0	DE	Debris, 20%
	31.2	ELJ	Encrustation Light At Joint, at 1 to 10o/c,
	31.7	CL	Crack Longitudinal, at 8o/c,
	31.7	CL	Crack Longitudinal, at 3o/c,
	32.7	CX	Connection Defective, 100mm at 12o/c,

---------- continued..----

Report : ENGLISH Page : 055 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

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48 Plr SR00440802X Dir DOWNSTREAM Date 06/04/2006 Time 19:52
Location: WELL STREET , BALLYLONGFORD

---------- Detail (cont.) ----------

	32.7	EM	Encrustation Medium, at 1 to 12o/c, 10%
	42.9	WL	Water Level, 30%
	43.7	DE	Debris, 30%
11	43.7	SA	Survey Abandoned, DUE TO DEBRIS

Report : ENGLISH Page : 056 Date : 28/04/2006 (15:57)
Database: USA5878A Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
49	USA LTD PC	USA5878	USA5878	0	0	000	SQ99449809X

Date	Time	Location
06/04/2006	20:14	WELL STREET , BALLYLONGFORD

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ99449809	0.00	0.000	0.000	SQ99449805	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	9.2	9.2	Z	00003

VT	Machine	Comments	Purpose	Cat	Pre
PHILLIPS		NONE...	RANDOM SURVEY	?	-

Weather	Location
DRY	MAIN ROAD - SUB,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	9.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	9.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Extra Data - Structural override
User remarks Service override

Detail

11	0.0	ST	Start Of Survey,
11	0.0	MH	Manhole, SQ99449809
11	0.0	WL	Water Level, 20%
	1.5	JN	Junction, 100mm at 90c,
	2.8	GO	General Observation, CHIPPED JOINT
	4.6	GO	General Observation, CHIPS IN PIPE
	8.1	WL	Water Level, 30%
	9.2	MH	Manhole, SQ99449805
12	9.2	FH	Finished Survey,

APPENDIX 8

Flow Load Survey Report

Flow Monitoring & Characterisation Study - North Kerry Villages of Tarbert, Ballylongford, Ballyduff and Lixnaw

Nicholas O'Dwyer

9 March 2006

EURO environmental services

Unit 35, Boyne Business Park, Drogheda, Co Louth

Report No 2370/M04

1.0 Introduction

Michel Davitt of Nicholas O'Dwyer commissioned EURO environmental services to carry out a flow monitoring and characterisation assessment of waste water flows from four villages in North Kerry

- Tarbert
- Ballylongford
- Ballyduff and
- Lixnaw

The purpose of the study was to determine the flow and characterisation of the effluent streams for waste water treatment plant design.

The towns are located in rural areas of North Kerry. Tarbert and Ballylongford are located on the coast. Lixnaw and Ballyduff are located inland. Population statistics for the towns in 2005 are as follows:

Population data from C.S.O – Census 2002 data:

Ballyduff – 614 persons (deviation of 5.4%) – estimated population 2006 = 647

Ballylongford – 405 persons (deviation of 18.8%) – estimated population 2006 = 481

Lixnaw – 248 persons (deviation of 5.7%) – estimated population 2006 = 262

Tarbert – 548 persons (deviation of 9.4%) – estimated population 2006 = 599

Taken from:
http://www.eirestat.cso.ie/Census/TableViewer/tableView.aspx?ReportId=1661

The towns are rural, with mostly housing and some small retail units and pubs. Ballyduff has a small creamery and farm co operative. According to the caretaker Sean Kennelly no production activity is being carried out at Ballyduff, as it is used as a collection depot. This will need to be confirmed, as any discharge from milk processing will have a significant impact on design requirements.

2.0 Methodology

On Friday 20 January Geoff Fitzpatrick of EURO environmental services and Peter Bennis of Nicholas O' Dwyer carried out preliminary assessments of the waste water sewer systems at each of the locations. Suitable monitoring locations were selected and preliminary measurements carried out. A pre site assessment report was issued to Nicholas O' Dwyer proposing a number of monitoring locations at each site. Subject to a number of minor changes these were agreed and monitoring was arranged to commence on Tuesday 31 January 2006.

The four locations were monitored over a 2 week period from 31 January 2006 to 14 February 2006. In week 1 three monitors were placed at Tarbert and one at Ballyduff, in week 2, two monitors were located at Ballylongford and one at Lixnaw.

Geoff Fitzpatrick and Pavel Sedivy installed the monitors at the beginning of each week. Pavel stayed in North Kerry for the duration of the monitoring period, carrying out sampling and ensuring the monitors were operating correctly. He also carried out manual checks on flows as a cross check against the flow monitors.

Samples were taken from the samplers and transported by courier to EURO environmental services analytical laboratory in Drogheda, Co Louth. Analysis was carried out immediately for time dependent parameters, including BOD. Analysis was carried out to INAB accredited methods for all parameters with the exception of Suspended Solids, TKN and OFG.

3.0 Monitoring Locations

3.1 Tarbert

The Tarbert waste water sewer system has two septic tanks. Continuous monitoring was carried out at each location and downstream of septic tank 1.

Tarbert 1

Septic tank 1 – location 3 west (western tank) takes the main flow from the village. The sampling point was located directly upstream of the septic tank on the same site. It has a 12 inch diameter pipe that flows into the septic tank. There is also a 6 inch storm water overflow. This location was suitable for continuous flow monitoring.

Tarbert 2

This was located downstream of septic tank 1. It measured the flow from a 9 inch pipe taking a sewage flow from the north west side of the village – connecting via the weir. There was a small housing estate located in this area. There was a river / stream located adjacent to this monitoring point and evidence that this monitoring location could be tidal (sewage overflow from the manhole location). The proposed monitoring location was approximately 500mm above the level of the river / stream.

Tarbert 3

This was located at the eastern septic tank – location 3 east. This was a 9 inch pipe which drained a number of private houses to the south of the septic tank. The flow at this location was very low during installation of the monitoring equipment.

3.2 Ballylongford

Ballylongford is located approximately 500 m inland from the sea. The Ballyline river flows through the village. The sewer system varies in depth and at suitable monitoring locations is approximately 3 metres below surface.

During installation it was noted that all suitable monitoring locations were tidal. A monitoring location was identified on the road near monitoring point 4. During the pre assessment it was considered a suitable monitoring location and the flow monitoring equipment could be located underground.

The monitoring equipment was installed underground, however, during the first 24 hours, the tidal flow impacted on the composite monitoring. There was also a high risk of equipment being damaged due to high tides. Further to discussion with Colm Noonan of N O' Dwyer, this monitoring point was abandoned.

Monitoring point 7 was located to the rear of a new housing development in Ballylongford. A 12 inch pipe flows to the inlet screening chamber. A manhole is located directly upstream of the inlet chamber. A monitoring device was located at this monitoring point.

3.3 Ballyduff

Ballyduff is located inland. The monitoring point was located at the first suitable manhole upstream of the waste water treatment plant. The location was accessible and suitable for continuous monitoring. Sean Kennelly the caretaker of the plant confirmed that there was only 1 farmhouse downstream of this monitoring location.

3.4 Lixnaw

The Lixnaw sewer system had a number of issues. The main sewer is located below the main street in the village. The treatment plant is located at the lower end of the main street. There is a storm overflow system located at approximately location 2 on the attached map. During the pre assessment this overflow was noted to be overflowing during non storm conditions. It was therefore decided to locate the monitoring equipment directly upstream of the storm overflow at this location. There was sufficient space to locate the equipment underground and no risk of tidal or backflow issues.

A number of houses were excluded from the monitoring event. These houses were located downstream of the monitoring point.

4.0 Monitoring Programme

The following flow monitoring programme was carried out:

- Locations Tarbert 1, 2 and 3 were monitored for 7 days from Tuesday 31 January 2006 to Tuesday 7 February 2006. Monitoring conditions were ideal during this monitoring period with no rainfall recorded.

- The Ballyduff location was also monitored for 7 days from Tuesday 31 January 2006 to Tuesday 7 February 2006.

- Ballylongford 1 was monitored from Tuesday 7 February to Tuesday 14 February 2006. Ballylongford 2 was monitored from Tuesday 7 February to Wednesday 8 February. This monitoring location was then abandoned as it was unsuitable.

- Lixnaw was monitored from Tuesday 7 February to Tuesday 14 February 2006.

4.1 Equipment Used

ISCO flow monitoring and sampling equipment was used at all locations for this monitoring programme. Area and velocity flow measurement at all locations. Monitoring data was recorded in 2 minute intervals. The data was downloaded on completion and graphed using Flowdata software.

4.2 Issues and Interference

Ballylongford monitoring was not satisfactory. This was due to the location of the monitoring points and that all suitable locations for monitoring flow were tidal.

This will need to be further assessed, and will cause significant difficulties in the design of a treatment plant for this village.

It should also be noted that the samples are likely to have been contaminated with saline water. This will have an impact on the BOD results, and can surpress BOD readings. The COD results may be more suited for design purposes.

5.0 Findings

5.1 Tarbert

Flow volumes at Tarbert 1 ranged from 137 cubic metres per day to 185 cubic metres per day. The highest flow was recorded on the Saturday / Sunday 4 and 5 February. There was significant variation in the BOD results ranging from 50 to 230 mg/L, with an average BOD of 138 mg/L. Suspended solid levels ranged from 100 to 220 mg/L. TKN and ammonia results were consistent. Total phosphate levels ranged from 2.8 to 6.4 mg/L as P.

Tarbert 2 monitored the flow from the North west end of the village. This consisted of a small housing estate. Flow levels ranged from 12 to 67 cubic metres per day. This monitoring location may have been impacted by tidal flows and may have contributed to the significant variation. Effluent strength at this location was also lower which would indicate a dilution factor. BODs ranges from 42 to 55 mg/L, with CODs ranging from 214 to 102 mg/L. Suspended solids ranged from 53 to 115 mg/L.

Tarbert 3 had very low flow volumes and only recorded flows for two of the seven days monitoring. BODs ranged from 39 to 195 mg/L, with suspended solids ranging from 59 to 279 mg/L.

5.2 Ballylongford

Ballylongford was a difficult location to monitor from due to the tidal interference. Flow volumes ranged from 98 to 310 cubic metres per day. At Ballylongford 1 high strength effluents were recorded. BODs ranged from 40 to 540 mg/L. On the Wednesday 8 February a very high BOD was recorded. These levels are not consistent with normal municipal effluent. The total phosphate levels were also high. Elevated results were recorded for all parameters.

In discussions with Eamonn Dunlea, caretaker, there are no obvious sources of the elevated effluent strength, other than possibly a local supermarket with a deli counter..

Ballylongford 2 was abandoned after 1 day.

5.3 Ballyduff

Flow volumes at Ballyduff ranged from 51 to 127 cubic metres per day. BODs ranged from 95 to 195 mg/L. Phosphate and ammonia levels were consistent with municipal effluent streams. It should be noted that there is a co – op / dairy activity in the village. The dairy activity was not in operation during the monitoring survey.

5.4 Lixnaw

Flow volumes at Lixnaw ranged from 47 to 171 cubic metres per day. BODs ranged from 103 to 263 mg/L. Nitrogen and phosphate levels were consistent with municipal effluent quality.

5.5 Rainfall

Rainfall during the period is attached. There was no rainfall for the first week monitoring. In the second week a total rainfall of 5.1 mm was recorded with 3.1 mm falling on 14 February 2006. This is the likely source of the increased flows recorded at Lixnaw and Ballylongford 1.

Geoff N Fitzpatrick
Director

Hinglin Yau
Environmental Scientist

9 March 2006

CompanyID	CompanyName	ClientRef	LabRef	ReceiptDate	ParameterName	Units	ValueText
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	BOD	mg/L	195
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	COD	mg/L	638
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	Solids (Total Suspended)	mg/L	316
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	45
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	Phosphate (Total)	mg/L as P	6.184
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	Phosphate (Ortho)	mg/L as P	4.921
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	Nitrogen (Total Oxidised)	mg/L as N	0.24
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	Ammonia	mg/L as N	38.47
4990	Nicholas O Dwyer	Ballyduff 1 3/02/06	4990/023/04	04/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	BOD	mg/L	95
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	COD	mg/L	178
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	Solids (Total Suspended)	mg/L	142
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	35
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	Phosphate (Total)	mg/L as P	3.954
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	Phosphate (Ortho)	mg/L as P	2.679
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	0.07
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	Ammonia	mg/L as N	25.46
4990	Nicholas O Dwyer	Ballyduffy 02/02/06	4990/022/25	03/02/2006	Oils, Fats & Grease	mg/L	10
4990	Nicholas O Dwyer	Ballyduffy 1 1 01/02/06	4990/022/14	03/02/2006	COD	mg/L	125
4990	Nicholas O Dwyer	Ballyduffy 1 2 01/02/06	4990/022/15	03/02/2006	COD	mg/L	802
4990	Nicholas O Dwyer	Ballyduffy 1 3 01/02/06	4990/022/16	03/02/2006	COD	mg/L	1141
4990	Nicholas O Dwyer	Ballyduffy 1 4 01/02/06	4990/022/17	03/02/2006	COD	mg/L	564
4990	Nicholas O Dwyer	Ballyduffy 1 5 01/02/06	4990/022/18	03/02/2006	COD	mg/L	542
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	BOD	mg/L	147
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	COD	mg/L	562
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	Solids (Total Suspended)	mg/L	233
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	40
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	Phosphate (Total)	mg/L as P	2.414
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	Phosphate (Ortho)	mg/L as P	2.404
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	Ammonia	mg/L as N	39.00
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/06 15.00	4990/024/14	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	BOD	mg/L	129
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	COD	mg/L	666

4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	Solids (Total Suspended)	mg/L	327
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	49
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	Phosphate (Total)	mg/L as P	5.517
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	Phosphate (Ortho)	mg/L as P	3.733
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	Ammonia	mg/L as N	38.62
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 07/02/0615.00	4990/024/13	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	BOD	mg/L	117
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	COD	mg/L	622
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	Solids (Total Suspended)	mg/L	294
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	56
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	Phosphate (Total)	mg/L as P	5.202
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	Phosphate (Ortho)	mg/L as P	5.076
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	Ammonia	mg/L as N	49.14
4990	Nicholas O Dwyer	Ballyduffy 1 Composite 1 03/02/06	4990/024/12	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	BOD	mg/L	145
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	COD	mg/L	733
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	Solids (Total Suspended)	mg/L	349
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	54
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	pH	pH Units	6.6
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	Phosphate (Total)	mg/L as P	5.867
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	Phosphate (Ortho)	mg/L as P	4.021
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	0.04
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	Ammonia	mg/L as N	36.62
4990	Nicholas O Dwyer	Ballyduffy 1 Composite Sample 01/02/06	4990/022/19	03/02/2006	Oils, Fats & Grease	mg/L	5
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	BOD	mg/L	40
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	COD	mg/L	205
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	Solids (Total Suspended)	mg/L	189
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	6
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	Phosphate (Total)	mg/L as P	0.846
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	Phosphate (Ortho)	mg/L as P	0.080
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	Ammonia	mg/L as N	1.16
4990	Nicholas O Dwyer	Ballylongford 09/02/06	4990/027/01	10/02/2006	Oils, Fats & Grease	mg/L	20

4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	BOD	mg/L	
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	COD	mg/L	6140
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	Solids (Total Suspended)	mg/L	1773
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	52
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	pH	pH Units	6.3
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	Phosphate (Total)	mg/L as P	9.598
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	Phosphate (Ortho)	mg/L as P	9.184
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	Nitrogen (Total Oxidised)	mg/L as N	0.63
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	Ammonia	mg/L as N	42.80
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/025/01	09/02/2006	Oils, Fats & Grease	mg/L	7
4990	Nicholas O Dwyer	Ballylongford 1 08/02/06	4990/026/01	09/02/2006	COD	mg/L	593
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	BOD	mg/L	450
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	COD	mg/L	467
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	Solids (Total Suspended)	mg/L	198
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	22
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	pH	pH Units	6.8
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	Phosphate (Total)	mg/L as P	1.527
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	Phosphate (Ortho)	mg/L as P	0.137
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	Ammonia	mg/L as N	0.36
4990	Nicholas O Dwyer	Ballylongford 1 10/02/06	4990/028/01	13/02/2006	Oils, Fats & Grease	mg/L	7
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	BOD	mg/L	1063
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	COD	mg/L	631
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	Solids (Total Suspended)	mg/L	358
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	21
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	pH	pH Units	6.5
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	Phosphate (Total)	mg/L as P	8.415
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	Phosphate (Ortho)	mg/L as P	3.036
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	0.28
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	Ammonia	mg/L as N	18.10
4990	Nicholas O Dwyer	Ballylongford 1 11/02/06	4990/029/01	15/02/2006	Oils, Fats & Grease	mg/L	40
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	BOD	mg/L	210
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	COD	mg/L	308
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	Solids (Total Suspended)	mg/L	176
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	11
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	pH	pH Units	6.7
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	Phosphate (Total)	mg/L as P	1.993
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	Phosphate (Ortho)	mg/L as P	0.707

4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	Ammonia	mg/L as N	2.25
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/05	15/02/2006	Oils, Fats & Grease	mg/L	36
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	BOD	mg/L	200
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	COD	mg/L	587
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	Solids (Total Suspended)	mg/L	159
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	17
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	pH	pH Units	6.6
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	Phosphate (Total)	mg/L as P	7.363
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	Phosphate (Ortho)	mg/L as P	0.867
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	Ammonia	mg/L as N	1.02
4990	Nicholas O Dwyer	Ballylongford 1 12.00 14/02/06	4990/029/06	15/02/2006	Oils, Fats & Grease	mg/L	94
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	BOD	mg/L	400
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	COD	mg/L	764
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	Solids (Total Suspended)	mg/L	341
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	19
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	pH	pH Units	6.4
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	Phosphate (Total)	mg/L as P	3.086
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	Phosphate (Ortho)	mg/L as P	3.008
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	0.47
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	Ammonia	mg/L as N	14.73
4990	Nicholas O Dwyer	Ballylongford 1 12/02/06	4990/029/03	15/02/2006	Oils, Fats & Grease	mg/L	62
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	BOD	mg/L	188
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	COD	mg/L	367
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	Solids (Total Suspended)	mg/L	128
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	7
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	pH	pH Units	6.8
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	Phosphate (Total)	mg/L as P	4.196
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	Phosphate (Ortho)	mg/L as P	0.613
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	Ammonia	mg/L as N	2.75
4990	Nicholas O Dwyer	Ballylongford 1 7.10 14/02/06	4990/029/09	15/02/2006	Oils, Fats & Grease	mg/L	34
4990	Nicholas O Dwyer	Ballylongford 10 08/02/06	4990/026/10	09/02/2006	COD	mg/L	116
4990	Nicholas O Dwyer	Ballylongford 11 08/02/06	4990/026/11	09/02/2006	COD	mg/L	196
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	BOD	mg/L	51
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	COD	mg/L	366
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	Solids (Total Suspended)	mg/L	281

4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	17
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	pH	pH Units	6.7
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	Phosphate (Total)	mg/L as P	2.426
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	Phosphate (Ortho)	mg/L as P	0.907
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	Ammonia	mg/L as N	5.48
4990	Nicholas O Dwyer	Ballylongford 2 08/01/06	4990/025/02	09/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Ballylongford 2 08/02/06	4990/026/02	09/02/2006	COD	mg/L	558
4990	Nicholas O Dwyer	Ballylongford 3 08/02/06	4990/026/03	09/02/2006	COD	mg/L	1246
4990	Nicholas O Dwyer	Ballylongford 4 08/02/06	4990/026/04	09/02/2006	COD	mg/L	92
4990	Nicholas O Dwyer	Ballylongford 6 08/02/06	4990/026/06	09/02/2006	COD	mg/L	115
4990	Nicholas O Dwyer	Ballylongford 7 08/02/06	4990/026/07	09/02/2006	COD	mg/L	96
4990	Nicholas O Dwyer	Ballylongford 8 08/02/06	4990/026/08	09/02/2006	COD	mg/L	97
4990	Nicholas O Dwyer	Ballylongford 9 08/02/06	4990/026/09	09/02/2006	COD	mg/L	106
4990	Nicholas O Dwyer	Ballylongofrd 5 08/02/06	4990/026/05	09/02/2006	COD	mg/L	123
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	BOD	mg/L	263
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	COD	mg/L	378
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	Solids (Total Suspended)	mg/L	352
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	34
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	pH	pH Units	6.9
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	Phosphate (Total)	mg/L as P	5.698
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	Phosphate (Ortho)	mg/L as P	2.390
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	Ammonia	mg/L as N	22.97
4990	Nicholas O Dwyer	Lixnow 08/02/06	4990/025/03	09/02/2006	Oils, Fats & Grease	mg/L	5
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	BOD	mg/L	103
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	COD	mg/L	259
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	Solids (Total Suspended)	mg/L	119
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	38
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	pH	pH Units	7.4
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	Phosphate (Total)	mg/L as P	3.743
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	Phosphate (Ortho)	mg/L as P	3.350
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	Ammonia	mg/L as N	29.68
4990	Nicholas O Dwyer	Lixnow 09/02/06	4990/027/02	10/02/2006	Oils, Fats & Grease	mg/L	9
4990	Nicholas O Dwyer	Lixnow 1 08/02/06	4990/026/12	09/02/2006	COD	mg/L	188
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	BOD	mg/L	120
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	COD	mg/L	276

4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	Solids (Total Suspended)	mg/L	33
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	33
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	Phosphate (Total)	mg/L as P	2.254
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	Phosphate (Ortho)	mg/L as P	2.048
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	Ammonia	mg/L as N	23.09
4990	Nicholas O Dwyer	Lixnow 10/02/06	4990/028/02	13/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	BOD	mg/L	
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	COD	mg/L	469
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	Solids (Total Suspended)	mg/L	224
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	22
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	Phosphate (Total)	mg/L as P	3.244
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	Phosphate (Ortho)	mg/L as P	2.319
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	Ammonia	mg/L as N	26.32
4990	Nicholas O Dwyer	Lixnow 11/02/06	4990/029/02	15/02/2006	Oils, Fats & Grease	mg/L	22
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	BOD	mg/L	154
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	COD	mg/L	284
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	Solids (Total Suspended)	mg/L	52
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	29
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	Phosphate (Total)	mg/L as P	2.486
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	Phosphate (Ortho)	mg/L as P	2.108
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	Ammonia	mg/L as N	26.68
4990	Nicholas O Dwyer	Lixnow 12/02/06	4990/029/04	15/02/2006	Oils, Fats & Grease	mg/L	32
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	BOD	mg/L	108
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	COD	mg/L	332
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	Solids (Total Suspended)	mg/L	79
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	31
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	pH	pH Units	7.4
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	Phosphate (Total)	mg/L as P	3.849
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	Phosphate (Ortho)	mg/L as P	3.375
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	Ammonia	mg/L as N	28.44
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/07	15/02/2006	Oils, Fats & Grease	mg/L	13

4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	BOD	mg/L	103
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	COD	mg/L	447
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	Solids (Total Suspended)	mg/L	143
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	32
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	pH	pH Units	7.3
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	Phosphate (Total)	mg/L as P	3.821
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	Phosphate (Ortho)	mg/L as P	3.803
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	Ammonia	mg/L as N	29.97
4990	Nicholas O Dwyer	Lixnow 13.00 14/02/06	4990/029/08	15/02/2006	Oils, Fats & Grease	mg/L	19
4990	Nicholas O Dwyer	Lixnow 2 08/02/06	4990/026/13	09/02/2006	COD	mg/L	124
4990	Nicholas O Dwyer	Lixnow 3 08/02/06	4990/026/14	09/02/2006	COD	mg/L	108
4990	Nicholas O Dwyer	Lixnow 4 08/02/06	4990/026/15	09/02/2006	COD	mg/L	266
4990	Nicholas O Dwyer	Lixnow 5 08/02/06	4990/026/16	09/02/2006	COD	mg/L	133
4990	Nicholas O Dwyer	Lixnow 6 08/02/06	4990/026/17	09/02/2006	COD	mg/L	100
4990	Nicholas O Dwyer	Lixnow 7 08/02/06	4990/026/18	09/02/2006	COD	mg/L	30
4990	Nicholas O Dwyer	Lixnow 8 08/02/06	4990/026/19	09/02/2006	COD	mg/L	9
4990	Nicholas O Dwyer	Lixnow 9 08/02/06	4990/026/20	09/02/2006	COD	mg/L	57
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	BOD	mg/L	76
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	COD	mg/L	206
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	Solids (Total Suspended)	mg/L	115
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	28
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	Phosphate (Total)	mg/L as P	3.571
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	Phosphate (Ortho)	mg/L as P	2.980
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	Ammonia	mg/L as N	22.35
4990	Nicholas O Dwyer	Tarbert 1 3/02/06	4990/023/01	04/02/2006	Oils, Fats & Grease	mg/L	13
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	BOD	mg/L	55
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	COD	mg/L	153
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	Solids (Total Suspended)	mg/L	80
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	17
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	Phosphate (Total)	mg/L as P	3.115
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	Phosphate (Ortho)	mg/L as P	2.521
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	Ammonia	mg/L as N	16.07
4990	Nicholas O Dwyer	Tarbert 2 3/02/06	4990/023/02	04/02/2006	Oils, Fats & Grease	mg/L	11

4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	BOD	mg/L	195
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	COD	mg/L	478
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	Solids (Total Suspended)	mg/L	219
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	35
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	pH	pH Units	7.0
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	Phosphate (Total)	mg/L as P	4.555
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	Phosphate (Ortho)	mg/L as P	3.659
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	Ammonia	mg/L as N	26.78
4990	Nicholas O Dwyer	Tarbert 3 3/02/06	4990/023/03	04/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 1 - 1 01/02/06	4990/022/01	03/02/2006	COD	mg/L	129
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	BOD	mg/L	46
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	COD	mg/L	287
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	Solids (Total Suspended)	mg/L	100
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	29
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	Phosphate (Total)	mg/L as P	2.866
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	Phosphate (Ortho)	mg/L as P	2.176
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	Ammonia	mg/L as N	21.67
4990	Nicholas O Dwyer	Tarbet 1 02/02/06	4990/022/22	03/02/2006	Oils, Fats & Grease	mg/L	14
4990	Nicholas O Dwyer	Tarbet 1 10 01/02/06	4990/022/10	03/02/2006	COD	mg/L	18
4990	Nicholas O Dwyer	Tarbet 1 11 01/02/06	4990/022/11	03/02/2006	COD	mg/L	244
4990	Nicholas O Dwyer	Tarbet 1 12 01/02/06	4990/022/12	03/02/2006	COD	mg/L	158
4990	Nicholas O Dwyer	Tarbet 1 2 01/02/06	4990/022/02	03/02/2006	COD	mg/L	163
4990	Nicholas O Dwyer	Tarbet 1 3 01/02/06	4990/022/03	03/02/2006	COD	mg/L	153
4990	Nicholas O Dwyer	Tarbet 1 4 01/02/06	4990/022/04	03/02/2006	COD	mg/L	166
4990	Nicholas O Dwyer	Tarbet 1 5 01/02/06	4990/022/05	03/02/2006	COD	mg/L	256
4990	Nicholas O Dwyer	Tarbet 1 6 01/02/06	4990/022/06	03/02/2006	COD	mg/L	179
4990	Nicholas O Dwyer	Tarbet 1 7 01/02/06	4990/022/07	03/02/2006	COD	mg/L	117
4990	Nicholas O Dwyer	Tarbet 1 8 01/02/06	4990/022/08	03/02/2006	COD	mg/L	49
4990	Nicholas O Dwyer	Tarbet 1 9 01/02/06	4990/022/09	03/02/2006	COD	mg/L	24
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	BOD	mg/L	50
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	COD	mg/L	166
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	Solids (Total Suspended)	mg/L	118
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	30
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	Phosphate (Total)	mg/L as P	2.991

4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	Phosphate (Ortho)	mg/L as P	2.190
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	Ammonia	mg/L as N	20.40
4990	Nicholas O Dwyer	Tarbet 1 Composite 01/02/06	4990/022/13	03/02/2006	Oils, Fats & Grease	mg/L	5
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	BOD	mg/L	170
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	COD	mg/L	357
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	Solids (Total Suspended)	mg/L	10
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	33
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	Phosphate (Total)	mg/L as P	4.355
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	Phosphate (Ortho)	mg/L as P	2.615
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	Ammonia	mg/L as N	25.56
4990	Nicholas O Dwyer	Tarbet 1 Composite 04/02/06 Fri - Sat 8.20 - 8.20	4990/024/01	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	BOD	mg/L	103
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	COD	mg/L	298
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	Solids (Total Suspended)	mg/L	220
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	24
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	Phosphate (Total)	mg/L as P	4.118
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	Phosphate (Ortho)	mg/L as P	2.686
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	Ammonia	mg/L as N	21.71
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/03	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	BOD	mg/L	230
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	COD	mg/L	397
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	Solids (Total Suspended)	mg/L	200
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	17
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	Phosphate (Total)	mg/L as P	6.412
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	Phosphate (Ortho)	mg/L as P	2.724
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	Ammonia	mg/L as N	16.94
4990	Nicholas O Dwyer	Tarbet 1 Composite 1 07/02/06 11.35	4990/024/04	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	BOD	mg/L	200
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	COD	mg/L	367
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	Solids (Total Suspended)	mg/L	107
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	21

4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	Phosphate (Total)	mg/L as P	4.182
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	Phosphate (Ortho)	mg/L as P	2.514
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	Ammonia	mg/L as N	19.66
4990	Nicholas O Dwyer	Tarbet 1 Composite Sat - Sun	4990/024/02	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	BOD	mg/L	53
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	COD	mg/L	129
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	Solids (Total Suspended)	mg/L	69
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	24
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	pH	pH Units	7.3
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	Phosphate (Total)	mg/L as P	2.649
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	Phosphate (Ortho)	mg/L as P	1.690
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	Ammonia	mg/L as N	17.86
4990	Nicholas O Dwyer	Tarbet 2 01/02/06	4990/022/20	03/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	BOD	mg/L	45
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	COD	mg/L	102
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	Solids (Total Suspended)	mg/L	66
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	20
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	Phosphate (Total)	mg/L as P	2.532
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	Phosphate (Ortho)	mg/L as P	1.725
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	0.58
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	Ammonia	mg/L as N	14.51
4990	Nicholas O Dwyer	Tarbet 2 02/02/06	4990/022/23	03/02/2006	Oils, Fats & Grease	mg/L	25
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	BOD	mg/L	45
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	COD	mg/L	138
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	Solids (Total Suspended)	mg/L	63
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	27
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	pH	pH Units	7.3
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	Phosphate (Total)	mg/L as P	3.187
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	Phosphate (Ortho)	mg/L as P	2.146
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	4.50
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	Ammonia	mg/L as N	25.32
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06	4990/024/06	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	BOD	mg/L	42
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	COD	mg/L	214

4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	Solids (Total Suspended)	mg/L	115
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	28
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	pH	pH Units	7.3
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	Phosphate (Total)	mg/L as P	3.614
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	Phosphate (Ortho)	mg/L as P	2.263
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	1.35
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	Ammonia	mg/L as N	26.94
4990	Nicholas O Dwyer	Tarbet 2 Composite 07/02/06 11.25	4990/024/07	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	BOD	mg/L	55
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	COD	mg/L	128
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	Solids (Total Suspended)	mg/L	53
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	21
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	Phosphate (Total)	mg/L as P	2.800
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	Phosphate (Ortho)	mg/L as P	1.933
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	Ammonia	mg/L as N	19.63
4990	Nicholas O Dwyer	Tarbet 2 Composite Fri Sat Sun Mon 06/02/06	4990/024/05	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	BOD	mg/L	95
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	COD	mg/L	491
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	Solids (Total Suspended)	mg/L	235
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	35
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	Phosphate (Total)	mg/L as P	3.904
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	Phosphate (Ortho)	mg/L as P	2.555
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	Ammonia	mg/L as N	20.88
4990	Nicholas O Dwyer	Tarbet 3 01/02/06	4990/022/21	03/02/2006	Oils, Fats & Grease	mg/L	9
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	BOD	mg/L	39
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	COD	mg/L	121
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	Solids (Total Suspended)	mg/L	69
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	19
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	pH	pH Units	7.2
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	Phosphate (Total)	mg/L as P	2.292
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	Phosphate (Ortho)	mg/L as P	1.690
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	Ammonia	mg/L as N	17.15
4990	Nicholas O Dwyer	Tarbet 3 02/02/06	4990/022/24	03/02/2006	Oils, Fats & Grease	mg/L	17

4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	BOD	mg/L	93
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	COD	mg/L	253
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	Solids (Total Suspended)	mg/L	59
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	23
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	Phosphate (Total)	mg/L as P	2.492
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	Phosphate (Ortho)	mg/L as P	0.996
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	Ammonia	mg/L as N	17.78
4990	Nicholas O Dwyer	Tarbet 3 Composite 04/02/06 10.15	4990/024/08	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	BOD	mg/L	165
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	COD	mg/L	239
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	Solids (Total Suspended)	mg/L	279
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	28
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	pH	pH Units	6.7
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	Phosphate (Total)	mg/L as P	4.538
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	Phosphate (Ortho)	mg/L as P	2.331
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	Ammonia	mg/L as N	23.95
4990	Nicholas O Dwyer	Tarbet 3 Composite 05/02/06 10.15	4990/024/09	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	BOD	mg/L	62
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	COD	mg/L	294
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	Solids (Total Suspended)	mg/L	158
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	23
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	Phosphate (Total)	mg/L as P	3.371
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	Phosphate (Ortho)	mg/L as P	1.711
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	Ammonia	mg/L as N	18.75
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06	4990/024/10	08/02/2006	Oils, Fats & Grease	mg/L	<5
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	BOD	mg/L	54
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	COD	mg/L	252
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	Solids (Total Suspended)	mg/L	142
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	Nitrogen (Total Kjeldahl)	mg/L as N	20
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	pH	pH Units	7.1
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	Phosphate (Total)	mg/L as P	3.332
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	Phosphate (Ortho)	mg/L as P	1.722
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	Nitrogen (Total Oxidised)	mg/L as N	<0.03

4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	Ammonia	mg/L as N	18.78
4990	Nicholas O Dwyer	Tarbet 3 Composite 07/02/06 10.37	4990/024/11	08/02/2006	Oils, Fats & Grease	mg/L	<5

Effluent - Ballyduff 1 - Composite Samples

Date	Week Day	BOD mg/L	COD mg/L	pH pH Units	Nitrogen (TKN) mg/L as N	Phosphate (Total) mg/L as P	Phosphate (ortho) mg/L as P	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) mg/L	Flow m3/Day
01/02/2006	Wednesday	145	733	6.6	54	5.867	4.021	36.62	5	349	51.3
02/02/2006	Thursday	95	178	7.0	35	3.954	2.679	25.46	10	142	108.1
03/02/2006	Friday	195	638	7.0	45	6.184	4.921	38.47	<5	316	106.2
04/02/2006	Saturday	117	622	7.2	56	5.202	5.076	49.14	<5	294	91.7
05/02/2006	Sunday	147	562	7.0	40	2.414	2.404	39.00	<5	233	103.9
06/02/2006	Monday	129	666	7.0	49	5.517	3.733	38.62	<5	327	91.6
07/02/2006	Tuesday										127.8
											65.8
	Max	195	733	7.2	56	6.184	5.076	49.14	10	349	127.8
	Min	95	178	6.6	35	2.414	2.404	25.46	5	142	51.3
	Average	138	567	7.0	47	4.856	3.806	37.89	8	277	93.3

Loadings per Day - Kgs

		BOD Kgs/Day	COD Kgs/Day	pH	Nitrogen (TKN) Kgs/Day	Phosphate (Total) Kgs/Day	Phosphate (ortho) mg/L as P	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) Kgs/Day
01/02/2006	Wednesday	7.43	37.57	n/a	2.77	0.30	0.21	1.88	0.26	17.89
02/02/2006	Thursday	10.27	19.25	n/a	3.78	0.43	0.29	2.75	1.08	15.36
03/02/2006	Friday	20.71	67.76	n/a	4.78	0.66	0.52	4.09	n/a	33.56
04/02/2006	Saturday	10.73	57.05	n/a	5.14	0.48	0.47	4.51	n/a	26.97
05/02/2006	Sunday	15.27	58.39	n/a	4.16	0.25	0.25	4.05	n/a	24.21
06/02/2006	Monday	11.82	61.00	n/a	4.49	0.51	0.34	3.54	n/a	29.95
07/02/2006	Tuesday									
	Max	20.71	67.76	-	5.14	0.66	0.52	4.51	1.08	33.56
	Min	7.43	19.25	-	2.77	0.25	0.21	1.88	0.26	15.36
	Average	12.88	52.86	0.65	4.34	0.45	0.36	3.53	0.70	25.83

Diurnal COD	Sample Time	Date	Parameter	Units	Result
Sample 1	00:00 - 05:00	01/02/2006	COD	mg/L	125
Sample 2	05:00 - 10:00	01/02/2006	COD	mg/L	802
Sample 3	10:00 - 15:00	01/02/2006	COD	mg/L	1141
Sample 4	15:00 - 20:00	01/02/2006	COD	mg/L	564
Sample 5	20:00 - 24:00	01/02/2006	COD	mg/L	542

Effluent - Ballylongford1 - Composite Samples

Date	Week Day	BOD mg/L	COD mg/L	pH	Nitrogen (TKN) mg/L as N	Phosphate (Total) mg/L as P	Phosphate (ortho) mg/L as P	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) mg/L	Flow m3/Day
08/02/2006	Wednesday	*305*	6140	6.3	52	9.598	9.184	42.80	7	1773	185.3
09/02/2006	Thursday	40	205	7.0	6	0.846	0.080	1.16	20	189	N/A
10/02/2006	Friday	450	467	6.8	22	1.527	0.137	0.36	7	198	N/A
11/02/2006	Saturday	531	631	6.5	21	8.415	3.036	18.10	40	358	103.1
12/02/2006	Sunday	400	764	6.4	19	3.086	3.008	14.73	62	341	309.6
13/02/2006	Monday	200	587	6.6	17	7.363	0.867	1.02	94	159	97.7
14/02/2006	Tuesday	210	308	6.7	11	1.993	0.707	2.25	36	176	308.9
	Max	531	6140	7.0	52	9.598	9.184	42.80	94	1773	309.6
	Min	40	205	6.3	6	0.846	0.080	0.36	7	159	97.7
	Average	305	1300	6.6	21	4.690	2.431	11.49	38	456	200.9

Loadings per Day - Kgs

		BOD Kgs/Day	COD Kgs/Day	pH	Nitrogen (TKN) Kgs/Day	Phosphate (Total) Kgs/Day	Phosphate (ortho) mg/L as P	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) Kgs/Day
08/02/2006	Wednesday	56.52	1,137.86	n/a	9.64	1.78	1.70	7.93	1.30	328.57
09/02/2006	Thursday	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10/02/2006	Friday	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
11/02/2006	Saturday	54.74	65.05	n/a	2.16	0.87	0.31	1.87	4.12	36.91
12/02/2006	Sunday	123.84	236.54	n/a	5.88	0.96	0.93	4.56	19.20	105.57
13/02/2006	Monday	19.54	57.36	n/a	1.66	0.72	0.08	0.10	9.19	15.54
14/02/2006	Tuesday	64.87	95.15	n/a	3.40	0.62	0.22	0.70	11.12	54.37
	Max	123.84	1,137.86		9.64	1.78	1.70	7.93	19.20	328.57
	Min	19.54	57.36		1.66	0.62	0.08	0.10	1.30	15.54
	Average	61.31	261.27		4.25	0.94	0.49	2.31	7.64	91.68

Diurnal COD	Sample Time	Date	Parameter	Units	Result
Sample 1	14:00 - 16:00	07/02/2006	COD	mg/L	593
Sample 2	16:00 - 18:00	07/02/2006	COD	mg/L	558
Sample 3	18:00 - 20:00	07/02/2006	COD	mg/L	1246
Sample 4	20:00 - 22:00	07/02/2006	COD	mg/L	92
Sample 5	22:00 - 24:00	07/02/2006	COD	mg/L	123
Sample 6	00:00 - 02:00	08/02/2006	COD	mg/L	115
Sample 7	02:00 - 04:00	08/02/2006	COD	mg/L	96
Sample 8	04:00 - 06:00	08/02/2006	COD	mg/L	97
Sample 9	06:00 - 08:00	08/02/2006	COD	mg/L	106
Sample 10	08:00 - 10:00	08/02/2006	COD	mg/L	116
Sample 11	10:00 - 12:00	08/02/2006	COD	mg/L	196

Effluent - Lixnaw - Composite Samples

Date	Week Day	BOD mg/L	COD mg/L	pH	Nitrogen (TKN) mg/L as N	Phosphate (Total) mg/L as P	Phosphate (ortho) mg/L as P	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) mg/L	Flow m3/Day
08/02/2006	Wednesday	263	378	6.9	34	5.698	2.390	22.97	5	352	54.4
09/02/2006	Thursday	103	259	7.4	38	3.743	3.350	29.68	9	119	71.3
10/02/2006	Friday	120	276	7.1	33	2.254	2.048	23.09	<5	33	67.2
11/02/2006	Saturday	*118*	469	7.0	22	3.244	2.319	26.32	22	224	61.7
12/02/2006	Sunday	154	284	7.0	29	2.486	2.108	26.68	32	52	87.0
13/02/2006	Monday	108	332	7.4	31	3.849	3.375	28.44	13	79	56.9
14/02/2006	Tuesday	103	447	7.3	32	3.821	3.803	29.97	19	143	171.6
											46.9
	Max	263	469	7.4	38	5.698	3.803	29.97	32	352	171.6
	Min	103	259	6.9	22	2.254	2.048	22.97	5	33	46.9
	Average	138	349	7.2	31	3.585	2.770	26.74	17	143	77.1

Loadings per Day - Kgs

		BOD Kgs/Day	COD Kgs/Day	pH	Nitrogen (TKN) Kgs/Day	Phosphate (Total) Kgs/Day	Phosphate (ortho) mg/L as P	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) Kgs/Day
08/02/2006	Wednesday	14.30	20.55	n/a	1.85	0.31	0.13	1.25	0.27	19.14
09/02/2006	Thursday	7.34	18.46	n/a	2.71	0.27	0.24	2.12	0.64	8.48
10/02/2006	Friday	8.06	18.54	n/a	2.22	0.15	0.14	1.55	n/a	2.22
11/02/2006	Saturday	7.27	28.91	n/a	1.36	0.20	0.14	1.62	1.36	13.81
12/02/2006	Sunday	13.40	24.72	n/a	2.52	0.22	0.18	2.32	2.79	4.53
13/02/2006	Monday	6.15	18.89	n/a	1.76	0.22	0.19	1.62	0.74	4.50
14/02/2006	Tuesday	17.67	76.70	n/a	5.49	0.66	0.65	5.14	3.26	24.54
	Max	17.67	76.70		5.49	0.66	0.65	5.14	3.26	24.54
	Min	6.15	18.46		1.36	0.15	0.13	1.25	0.27	2.22
	Average	10.68	26.94		2.41	0.28	0.21	2.06	1.29	11.04

Diurnal COD	Sample Time	Date	Parameter	Units	Result
Sample 1	12:00 - 14:00	07/02/2006	COD	mg/L	378
Sample 2	14:00 - 16:00	07/02/2006	COD	mg/L	124
Sample 3	16:00 - 18:00	07/02/2006	COD	mg/L	108
Sample 4	18:00 - 20:00	07/02/2006	COD	mg/L	266
Sample 5	20:00 - 22:00	07/02/2006	COD	mg/L	133
Sample 6	22:00 - 24:00	07/02/2006	COD	mg/L	100
Sample 7	00:00 - 02:00	08/02/2006	COD	mg/L	30
Sample 8	02:00 - 04:00	08/02/2006	COD	mg/L	9
Sample 9	04:00 - 06:00	08/02/2006	COD	mg/L	57

Effluent - Tarbert 1 - Composite Samples

Date	Week Day	BOD mg/L	COD mg/L	pH	Nitrogen (TKN) mg/L as N	Phosphate (Total) mg/L as P	Phosphate (ortho) mg/L as P	TON	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) mg/L	Flow m3/Day
01/02/2006	Wednesday	50	166	7.1	30	2.991	2.19	<0.03	20.4	5	118	172.000
02/02/2006	Thursday	46	287	7.2	29	2.866	2.176	<0.03	21.67	14	100	155.532
03/02/2006	Friday	76	206	7.1	28	3.571	2.98	<0.03	22.35	13	115	152.876
04/02/2006	Saturday	170	357	7.2	33	4.355	2.615	<0.03	25.56	<5	10	166.659
05/02/2006	Sunday	200	367	7.2	21	4.182	2.514	<0.03	19.66	<5	107	184.651
06/02/2006	Monday	230	397	7.2	17	6.412	2.724	<0.03	16.94	<5	200	173.679
07/02/2006	Tuesday	103	298	7.2	24	4.118	2.686	<0.03	21.710	<5	220	137.011
	Max	230	397		33	6.412	2.98		25.56	14	220	185
	Min	46	206		17	2.866	2.176		16.94	13	10	137
	Average	138	319		25	4.251	2.616		21.315	13.500	125	163

Loadings per Day - Kgs

		BOD Kgs/Day	COD Kgs/Day		Nitrogen (TKN) Kgs/Day	Phosphate (Total) Kgs/Day	Phosphate (ortho) mg/L as P		Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) Kgs/Day
01/02/2006	Wednesday	8.60	28.55		5.16	0.51					20.30
02/02/2006	Thursday	7.15	44.64		4.51	0.45					15.55
03/02/2006	Friday	11.62	31.49		4.28	0.55					17.58
04/02/2006	Saturday	28.33	59.50		5.50	0.73					1.67
05/02/2006	Sunday	36.93	67.77		3.88	0.77					19.76
06/02/2006	Monday	39.95	68.95		2.95	1.11					34.74
07/02/2006	Tuesday	14.11	40.83		3.29	0.56					30.14
	Max	39.95	68.95		5.50	1.11	-		-	-	34.74
	Min	7.15	31.49		2.95	0.45	-		-	-	1.67
	Average	22.44	52.01		4.13	0.69	0.43		3.48	2.20	20.45

Effluent - Tarbert 2 - Composite Samples

Date	Week Day	BOD mg/L	COD mg/L	pH	Nitrogen (TKN) mg/L as N	Phosphate (Total) mg/L as P	Phosphate (ortho) mg/L as P	TON	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) mg/L	Flow m3/Day
01/02/2006	Wednesday											24.618
02/02/2006	Thursday	45	102	7.1	20	2.532	1.725	0.58	14.51	25	66	39.677
03/02/2006	Friday	55	153	7.2	17	3.115	2.521	<0.03	16.07	11	80	48.266
04/02/2006	Saturday	53	129	7.3	24	2.649	1.69	<0.03	17.86	<5	69	67.211
05/02/2006	Sunday	55	128	7.2	21	2.8	1.933	<0.03	19.63	<5	53	32.040
06/02/2006	Monday	42	214	7.3	28	3.614	2.263	1.35	26.94	<5	115	12.109
07/02/2006	Tuesday	45	138	7.3	27	3.187	2.146	4.500	25.320	<5	63	18.669
	Max	55	214		28	3.614	2.521		26.94	25	115	67
	Min	42	102		17	2.532	1.69		14.51	11	53	12
	Average	49	144		23	2.983	2.046		20.055	18.000	74	35

Loadings per Day - Kgs

		BOD Kgs/Day	COD Kgs/Day		Nitrogen (TKN) Kgs/Day	Phosphate (Total) Kgs/Day	Phosphate (ortho) mg/L as P		Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) Kgs/Day
01/02/2006	Wednesday	-	-		-	-					-
02/02/2006	Thursday	1.79	4.05		0.79	0.10					2.62
03/02/2006	Friday	2.65	7.38		0.82	0.15					3.86
04/02/2006	Saturday	3.56	8.67		1.61	0.18					4.64
05/02/2006	Sunday	1.76	4.10		0.67	0.09					1.70
06/02/2006	Monday	0.51	2.59		0.34	0.04					1.39
07/02/2006	Tuesday	0.84	2.58		0.50	0.06					1.18
	Max	3.56	8.67		1.61	0.18	-		-	-	4.64
	Min	0.51	2.58		0.34	0.04	-		-	-	1.18
	Average	1.70	4.99		0.79	0.10	0.07		0.70	0.62	2.58

Effluent - Tarbert 3 - Composite Samples

Date	Week Day	BOD mg/L	COD mg/L	pH	Nitrogen (TKN) mg/L as N	Phosphate (Total) mg/L as P	Phosphate (ortho) mg/L as P	TON	Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) mg/L	Flow m3/Day
01/02/2006	Wednesday	95	491	7.1	35	3.904	2.555	<0.03	20.88	9	235	0.000
02/02/2006	Thursday	39	121	7.2	19	2.292	1.69	<0.03	17.15	17	69	0.000
03/02/2006	Friday	195	478	7	35	4.555	3.659	<0.03	26.78	<5	219	0.000
04/02/2006	Saturday	93	253	7.1	23	2.492	0.996	<0.03	17.78	<5	59	20.368
05/02/2006	Sunday	165	239	6.7	28	4.538	2.331	<0.03	23.95	<5	279	0.000
06/02/2006	Monday	54	252	7.1	20	3.332	1.722	<0.03	18.78	<5	142	0.000
07/02/2006	Tuesday	62	294	7.1	23	3.371	1.711	<0.03	18.750	<5	158	37.348
	Max	195	491		35	4.555	3.659		26.78	17	279	37
	Min	39	121		19	2.292	0.996		17.15	17	59	-
	Average	101	273		25	3.430	2.018		20.532	17.000	154	8

Loadings per Day - Kgs

		BOD Kgs/Day	COD Kgs/Day		Nitrogen (TKN) Kgs/Day	Phosphate (Total) Kgs/Day	Phosphate (ortho) mg/L as P		Ammonia mg/L as N	Oils, Fats and Grease mg/L	Solids (Total Suspended) Kgs/Day
01/02/2006	Wednesday	-	-		-						-
02/02/2006	Thursday	-	-		-						-
03/02/2006	Friday	-	-		-	-					-
04/02/2006	Saturday	1.89	5.15		0.47	0.05					1.20
05/02/2006	Sunday	-	-		-	-					-
06/02/2006	Monday	-	-		-	-					-
07/02/2006	Tuesday	2.32	10.98		0.86	0.13					5.90
	Max	2.32	10.98		0.86	0.13	-		-	-	5.90
	Min	-	-		-	-	-		-	-	-
	Average	0.84	2.25		0.20	0.03	0.02		0.17	0.14	1.27

APPENDIX 9

Preliminary Site Investigation Report

APPENDIX 10

Archaeology Report

APPENDIX 11

Drawings (to scale @ A1)

G.2 Compliance with Water Quality Standards for Phosphorus Regulations (S.I. No. 258 of 1998).

Provide details on a programme of improvements, including any water quality management plans or catchment management plans in place, to ensure that improvements of water quality required under the Water Quality Standards for Phosphorous Regulations (S.I. No. 258 of 1998) are being achieved. Provide details of any specific measures adopted for waste water works specified in Phosphorus Measures Implementation reports and the progress to date of those measures. Provide details highlighting any waste water works that have been identified as the principal sources of pollution under the P regulations.

Attachment G.2 should contain the most recent programme of improvements and any associated documentation requested under Section G.3 of the application.

Attachment included	**Yes**	**No**
	√	

Attachment G.2 Compliance with Water Quality Standards for Phosphorus Regulations (S.I. No. 258 of 1998).

Key Effluent Wastewater Parameters

Wastewater is generated as a result of human activity and excreta, and consists of about 99% water and 1% solids. The water carries particulate matter, but also contains dissolved organic and inorganic substances. The primary wastewater constituents of environmental concern are Biochemical Oxygen Demand (BOD), Phosphorus (P) and Nitrogen (N), in various forms. The various parameters are explained below for completeness.

Phosphorus
Phosphorus can have a negative effect on a receiving water if the natural levels are exceeded. This is because Phosphorus is a limiting nutrient required for biological cell growth, and is usually in limited supply in fresh waters under natural conditions. Its lack of availability limits the amount of cell growth which can occur. If cell growth is not limited, Eutrophication can arise. Eutrophication is the process whereby excessive growth of algae or other plants occurs, followed by the subsequent utilisation of all oxygen in the water when decomposition of this excessive growth occurs.

Phosphorus is usually the limiting nutrient in freshwater, whereas Nitrogen is usually the limiting nutrient in the marine environment. The Phosphorus Regulations recommend very low concentration for MRP in rivers. The effluent discharge in this case is to an estuary however, and Nitrogen is usually taken as the limiting nutrient in the marine environment.

Phosphorus Regulations

The Phosphorus loads permitted in a river are governed by the Phosphorus Regulations (S.I. 258 of 1998). The salient features of these regulations are summarised below:

a) The standards quoted are in terms of Molybdate – Reactive Phosphate.
b) The concentrations measured are median values determined using a minimum of 10 samples taken at intervals of four weeks or longer in any 12 consecutive month period.
c) The existing biological quality rating / Q index is to be improved to meet the minimum target biological quality rating / Q index as detailed in the Regulations.

The Phosphorus Regulations however only apply to freshwaters such as rivers and lake and do not apply to estuarine waters. However, for the sake of completeness, the assimilative capacity in relation to Phosphorus will be examined.

Calculation

The requirements of the Urban Wastewater Treatment Regulations are for appropriate treatment, to allow the receiving waters to meet the relevant quality

objectives. Therefore effluent quality requirements are dependant on the background concentrations and the 95 percentile flow in the river (i.e. assimilative capacity) and calculated in accordance with the requirements of the Salmonid Water Regulations. Although the receiving water is estuarine, the calculations presented below are based on discharge to the Ballyline River, which is a conservative approach.

By concentration mass balance, the allowable effluent concentration is:

$$Ce = \frac{Cdn\,(Qe + Qr) - QrCr}{Qe}$$

Where:
Ce = allowable effluent concentration (mg/l)
Qe = effluent flow (m^3/s)
Cr = upstream background concentration (mg/l)
Qr = upstream 95%ile river flow (m^3/s)
Cdn = allowable downstream concentration (mg/l)

Phosphorus

The regulations state that the existing biological quality rating assigned between 1st January 1995 and 31st December 1997, or, "where monitoring was not carried out during that period, the biological quality rating first assigned by the Agency (the EPA) to that part based on monitoring carried out after 1997" is the rating upon which the improvements in Water Quality will be judged.

As the regulations determine the Q index using the median of 10 samples over 12 months (taken at intervals of 4 weeks or longer), the enforcement of the MRP load determined from 95%ile flows is extremely onerous. The more realistic load is given by using the average flow in the river as this is more representative of the variable flows to be encountered during the 12 month sampling period. Therefore the Waste Assimilative Capacity calculation is used with average flow to calculate the allowable increase in MRP load.

Discharge Specification

Phosphorus
An effluent standard of 1.0 mg/l would be required for MRP as a result of the low waste assimilative capacity of the Ballyline River, however, given the proposed discharge method, and the fact that the receiving water is estuarine, no Phosphorus standard is proposed.

Details of Proposed Wastewater Treatment Plant

The proposed treatment plant will discharge to the Ballyline River, which is tidal at the point of discharge. The river in turn discharges to the Lower Shannon Estuary at Ballylongford Bay. The following legislation was considered in establishing the proposed discharge standard from the WwTP:-

- The Local Government (Water Pollution) Act, 1977 (Water Quality Standards For Phosphorus) Regulations, 1998 (SI No. 258 of 1998) oblige local authorities to maintain or improve the water quality of rivers by 2007 by reference to the Q-Rating (biotic index) or the concentration of

molydbate reactive phosphate (MRP). These Regulations do not apply to estuarine waters.

Kerry County Council
Comhairle Chontae Chiarrai

Environment Protection Section

Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998.

Implementation Report

July 2004 – July 2006

This report has been prepared in accordance with the requirements of the Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998.

INTRODUCTION

The Local Government (Water Pollution) Act, 1977 (Water Quality Standards For Phosphorus) Regulations, 1998 set interim phosphorus related targets for river and lake water quality which must be met by 2007. In addition to this, the regulations also placed a requirement on all Local Authorities to draw up a Measures Report outlining the status of river and lake water quality within their functional areas and detailing the measures necessary to ensure compliance with the terms of the regulations. Local Authorities are also required to submit an implementation report on a biannual basis detailing progress on the implementation of each county's Measures Report.

The Kerry County Measures Report was produced by Kerry County Council in 1999. This report contained a comprehensive assessment of the status of river and lake water quality in the county, as established through baseline monitoring carried out over the period 1995-1997 by the EPA and the County Council. It also outlined the measures which were considered necessary to ensure compliance with the requirements of the Phosphorus Regulations.

This is the fourth implementation report to be prepared and submitted by Kerry County Council and covers the period July 2004 to July 2006.

SECTION 1 – WATER QUALITY IN THE FUNCTIONAL AREA

Please refer to tables 1.1 and 1.2 in the attached appendices.

River Quality

The number of rivers analysed for the purposes of this report was 88, involving sampling at 213 stations. Q status was assessed in the vast majority of cases by the EPA. Those stations highlighted in red in Table 1 were assessed for Q status by laboratory staff in Kerry County Council as follow up. These additional stations are being analysed as part of the follow up to Lough Leane Catchment Monitoring & Management Study.

Key to table 1.1

Some columns have been added to the table in question in addition to those supplied by the EPA :

- 3 columns show progression in Q values from 1996 through to 1998 through to the latest assessment i.e. 2004/06 .
- most of the Q-values shown in normal type are from the EPA. Those in red bold italics were analysed by KCC staff as follow up.
- An extra column is shown which indicates change in Q status between 1998 and 2006

  DET = deterioration in status
  IMP = improvement in status
  No change = no change in status

- In the case of MRP analysis, separate columns are included for results taken pre 1997, 2001/02, 2003/04 and 2005/06. Columns indicating the number of samples per station for mrp analysis in both times during survey are also included .
- In the column headed " Has either standard been achieved" the following notation is used :

  Yes = both mrp and Q standards have been achieved.
  Yes(Q) = only Q standard has been achieved
  Yes(P) = only P standard has been achieved
  No = neither standard has been achieved

Q status of rivers in Co Kerry ; ***Please refer to earlier measures report and table 1.1***

Fig 1 : Kerry river Stations: Biological status 1987-2006

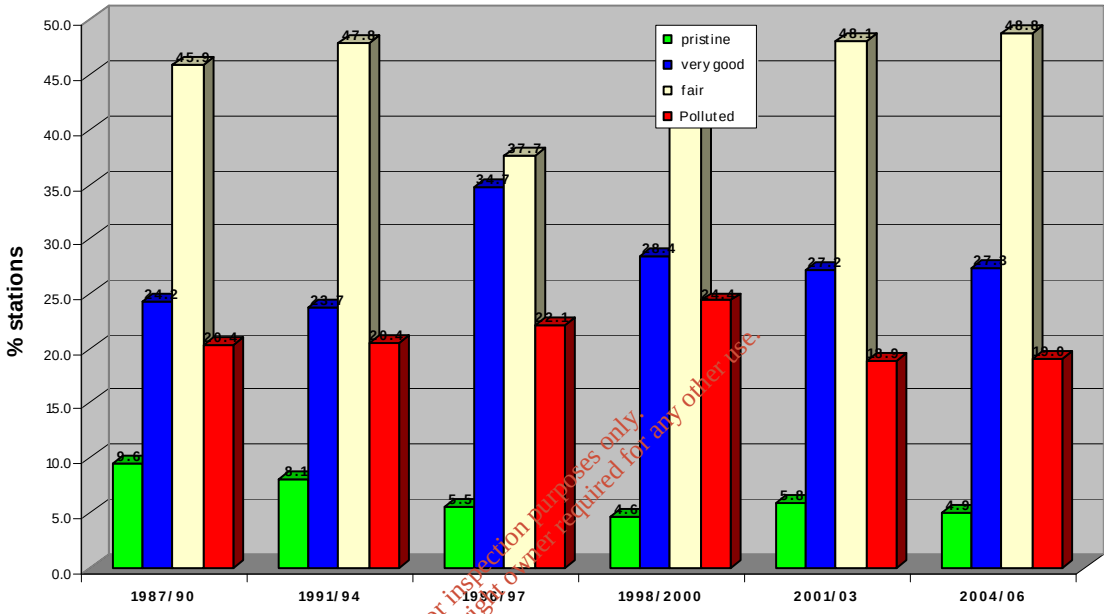

Table a

Q analysis period	1987/1990	1991/1994	1996/1997	1998/2000	2001/03	2004/06
No of stations analysed	157	187	199	197	199	205
No of pristine stations(Q 5)	15	15	11	9	12	10
No of very good stations (Q4- 5))	38	44	69	56	53	56
No of fair Stations (Q4)	72	89	75	84	89	100
No of Polluted stations (Q </= 3.5)	32	39	44	48	45	39
Breakdown of Polluted stations						
No of slightly Polluted stations (Q = 3.5)	13	19	25	26	24	26
No of moderately Polluted stations (Q = 3)	16	18	15	18	14	9
No of seriously Polluted stations (Q < 3)	3	2	4	3	5	4

Fig 1 graphically illustrates the change in Q status in the period 1987 to 2006. **Table a** puts some flesh in this by categorizing stations over the same time period into different Q categories. For the purposes of the above graph, polluted stations are regarded as any one having a Q value of equal or less than 3-4

This report is based largely on Q results taken 2004- 2006. We still have not got back some of Q values from EPA for 2006.Where these values do not exist results from 2002-2004 are used.
The last period (2004-2006) continues the pollution trend in a positive direction. ***19.0%*** of stations had Q values of less than or equal to 3-4, compared with ***24.4 %*** in 2000.

The biggest deterioration since 1996 would appear to be in the pristine/very good status to fair, i.e. Q 5/4-5 - Q 4. ***40.2*** to ***32.2 %*** . A reversal of this trend should therefore perhaps be one of the key objectives of any strategy in improvement of water quality in the county for the coming years.

Overall improvement in Q status was noted in 54 stations since 2000, while deterioration was noted in 33 stations. Q status targets have been met in 130 stations out of 206 i.e. 63 % . For more detailed interpretation of Q status please refer to Table 1.1.

Molybdate reactive Phosphorous status.

In this reporting period, 50 stations were analysed for MRP – a total of 1118 results. This compared with 2600 results for 201 stations in 2002.

This was because:

- There has been a continuing shortfall in resources and funding for the laboratory in last few years. Prioritization of monitoring therefore led to shortfalls in many areas. Increasing demands in areas such as drinking water monitoring (impact from 2000 drinking water regs) also contributed to shortfall.

- The lab has also reached its Physical and safety capacity to take any additional samples with present instrumentation resources

Focus of monitoring has been geared to:

1. Designated Salmonid river stations
2. river stations within L Lein catchment as a follow up to study
3. increased monitoring as a result of problems encountered in L Currane catchment
4. follow up to farm surveys as a result of earlier measures report.

The most recent results broadly back trend from earlier results. To date during course of Phosphorous program 164 out of 204 stations have reached their respective median mrp targets i.e. ***80.4 %*** .The strategy for the future will of course focus on increasing this figure towards 100 % as much as possible.
For further details on specific stations refer to earlier measures report and Table 1.2

Lake Monitoring *(Table 1.2)*

58 lakes have been identified for monitoring by the EPA (J Bowman Proposed Lake Monitoring program). Of these 12 have been identified as needing to be analysed at least three times a year :
Lough Lein, Currane, Guitane, Caragh, Clonlaghlin, Iskanamacteery, Glanmore, Gill,Derriana,Iskgahiny,Barfinnihy, Capall,

The remainder only needs to be analysed once per four years:

Callee	***Looscaunagh***	***Clonee***	***Acoose***
Dromtine	***Eagher***	***Inchiquin***	***Reagh***
Cummerna muck	***Cushvally***	***Cumeenadillure***	***Coomaglaslaw***
Cummer lough	***Cappanalea***	***Adoon***	***Kells***
Glannafreaghaun	***Nambrackdarrig***	***Lackagh***	***Namona***
Blarnageeha	***Cloon***	***Upper Lake***	***Fadda***
Mount Eagle	***Coomnacronia***	***Reagh***	***Crohane***
Gill	***Cooasaharn***	***Coomloughra***	***Cummer***
Anascaul	***Glan***	***Black***	***Uragh***
Kilbrean	***Brin***	***Augher***	***Cummeenaloughlan***
Muckross	***Doo***	***Garagarry***	***Napeasta***
Cummeenduff	***Dromoghty***	***Nakirka***	

Unfortunately because of a shortfall in resources we were unable to undertake this sampling program. Monitoring has been largely confined to ***L Lein catchment lakes, Caragh Lake, L Gill and L Currane and Lough Acosse.*** Any other monitoring has been of a reactive nature i.e. reports of Algal blooms etc. We would hope that resources would be forthcoming in the future to satisfy requirements for a proper Lake monitoring program for the county.
The roll out of RBD surveillance and operational monitoring will mean that at least 13 lakes will be covered i.e. ***Lein, Upper lake, Muckross, Guitane Caragh, Currane, Gill, Acosse, Brin, Cam, Inchiquin, Lough Na Mona, Clonlaghlin***

In 2005/2006 7 lakes were measured more than 6 times I.e. ***Currane, Lein, Caragh, Guitane, Acoose, L na mona, Upper lake, Muckross .*** Results of less frequency were taken from up to 16 others
A total of 791 samples were taken
Phosphorous levels quoted are based on mean of results for 2006

Analysis in recent years has noted improvements in trophic status of ***Lough leane*** and ***Caragh Lake***

However in the case of L Lein it is still vulnerable to potentially cyanobacterial blooms.

In the case of ***Lough Guitane*** some slurry spreading and a rise in housing close to shoreline has contributed to gradual rise in productivity of lake with corresponding rise in transient algal blooms.

Lough Gill is a 1000-acres shallow limestone lake and drains a moderately intensive agricultural catchment. A weir manages the outlet to sea. This weir did not function properly in 2001 thus allowing nutrients to be concentrated in lake. Results to date from 2002 to present indicates an improvement following repair of weir and also positing of Barley straw throughout lake.

An intensive monitoring program is in place for ***Lough Currane*** - between 2004 and 2006 at least 100 samples have been taken at various points throughout this lake. This arises because of perceived drop in angling returns and increased evidence of enrichment. Samples have been taken monthly for a period of at least 20 months. There is evidence of increasing enrichment and presence of significant numbers of cyanobacteria, particularly ***Oscillittoria***. In September of this year there was also a significant bloom of ***Anabeana*** noted The status of lake seems to have moved from Oligtrophic to Mesotrophic status. Curiously the main peaks of productivity are in Springtime March – May. The study, involving monitoring, farm surveys, septic tank audits and review of any industries in area is still ongoing. There is also an ongoing consultative process with stakeholders in catchment.

Though not manifesting itself yet in increased Chlorophyll or biomass there has been a notable increase of total Phosphorous in ***Upper lake*** and ***Muckross***. These lakes are normally in pristine condition –anything that threatens its status is therefore very worrying. The cause may be adduced to significant amounts of sediment been washed in from upland areas during winter months. This is been closely monitored at present.

SECTION 2 – IMPLEMENTATION OF MEASURES

Progress on implementation of the various measures recommended in the County Kerry Measures Report is detailed in the attached tables (Tables 2.1, 2.2, 2.3). These are categorised on the basis of :

(a) Measures to be implemented in the county as a whole,
(b) Measures to be implemented within each river catchment,
(c) Measures to be implemented within each lake catchment.

SECTION 3 - PROGRESS TO DATE

3.1 Planning Control and Enforcement Measures

a) PROGRESS DURING REPORTING PERIOD :

For Point Sources Discharges -

- On-going issuing, enforcement and review of licences under Sections 4 and 16 of the Water Pollution Acts –
    - 54 licenses currently in force under Section 4,
    - 28 licenses currently in force under Section 16.
- Continued implementation of the management proposals recommended in the Lough Leane Monitoring and Management Project Reports (both interim and final reports).
- Continued assessment of planning applications in terms of their potential impact on water quality.
- Preparation of plans for the provision of nutrient reduction at Listowel and Tralee wastewater treatment plants.
- Proceeded to tender for the construction of a number of new wastewater treatment plants (Barraduff, Waterville, Firies and Milltown).
- Progressed the preparation of preliminary reports for the provision of public wastewater collection and treatment systems for the following villages : Scartaglin, Finuge, Currow, Brandon, Boolteens, Beaufort, Asdee, Aughacasla, The Glen, Caherdaniel, Glenflesk, Cromane, Chapeltown and The Cashen.
- Progressed the preparation of preliminary reports for the up-grade or provision of wastewater treatment plants for the following villages : Tarbert, Ballylongford, Ballyduff, Lixnaw, Ardfert, Fenit, Abbeydorney, Kilflynn, Castlegregory, Annascaul, The Spa, Castlemiane, Glenbeigh, Sneem, Kilgarvan.
- Inclusion of Castleisland Sewerage Scheme Stage 2 in the Water Services Investment Programme 2004-2006.
- Progression of preparation of preliminary report for the up-grade of Kenmare Main Drainage Scheme.
- Progression to consultant appointment for the preparation of a Strategic Wastewater & Sludge Study for the whole county. This study is to provide a road map for the sustainable provision and operation of wastewater facilities for the county into the future.
- Adoption of a new Water Services "Assessment of Needs" List, 2006 by Kerry County Council which has re-prioritised wastewater treatment plant construction and up-grades throughout the county.
- Farm surveys carried out in the following river catchments : Feale, Flesk (Lower Catchment), Shanowen, Glashoreag.

- Total number of farm surveys undertaken during reporting period : 350;
- Closure plans finalised for a number of discontinued landfill sites, including Coolcaslagh (Killarney) and Milltown.
- Closure plans implemented for a number of discontinued landfill sites, namely Kenmare and Caherciveen.
- Continued operation of the North Kerry Engineered Landfill Facility at Muingnaminane in accordance with its EPA Waste Licence;
- Registration and control of existing quarries under Section 261 of the Planning & Development Act.

For Non Point-Source Discharges -

- Use of Section 21A of the Water Pollution Acts – 2 notices issued under Section 21A.
- Farm Surveys completed as above;
- Continued liaison with the Forest Service of the Department of Agriculture & Food in the area of forestry development, harvesting and management to ensure compliance with the various Forest Service Guidelines (particularly regarding new plantation development and aerial fertilisation).

General Enforcement Measures –

- Total number of reported water pollution incidents investigated : 341;
- Total number of notices issued under Section 12 of the Act : 142 (includes notices issued on foot of farm inspections carried out).
- On-going and regular monitoring/sampling of licences issued under Sections 4 and 16 of the Water Pollution Acts.

b) PROBLEMS ENCOUNTERED :

- Lack of resources, both staff and financial, to enable full implementation of the action programme outlined in the County Kerry Measures Report.
- Uncertainty and confusion generated by the protracted introduction of the EU Nitrates Directive Action Plan.

c) FUTURE PLANS/NEW DIRECTIONS :

- Extend the Farm Survey Programme to further catchments within County Kerry.
- Continued enforcement of a variety of sections under the Act (ie. Sections 3, 10,12,13,14, 23).
- Issue additional discharge licences under Sections 4 and 16 of the Act.
- Continued enforcement of all existing discharge licences issued under Sections 4 and 16 of the Act.
- Secure additional resources to enable greater enforcement of the Water Pollution Act.
- Instigate prosecutions under the Act as required.

- Continued implementation of the various catchment management proposals identified during the course of the Lough Leane Catchment Management and Monitoring Project.

3.2 Consultative and Co-operative Measures

a) PROGRESS DURING REPORTING PERIOD :

- Active participation in the new River Basin District structures – South Western RBD and Shannon RBD.
- Continued involvement of the Lough Leane Working Group (Drawn from a range of different stakeholder groups) in overseeing progress on the Lough Leane Monitoring and Management Project.
- Continued involvement with stakeholders in the Lough Currane Catchment Group : regular meetings with the group on a range of water quality management issues relevant to the catchment.

b) PROBLEMS ENCOUNTERED :

- Overlapping roles between local consultation groupings and the larger RBD group structures.

c) FUTURE PLANS/NEW DIRECTIONS :

- Continue developing the liaison structures which have been established with other local Authorities under the River Basin District structure required by the Water Framework Directive;
- Continue the good working structures established through the Lough Leane Working Group.
- Continued co-ordination and co-operation on activities which are common to both Local Authorities and the Fisheries Boards. (eg. farm surveying)

3.3 Monitoring Measures

a) PROGRESS DURING REPORTING PERIOD :

- Continued monitoring by Kerry County Council of various EPA river and lake stations to assess progress in achieving necessary water quality targets.
- Implementation of a revised monitoring programme for the Lough Leane Catchment : covering lake, river and groundwater quality. This was essentially a scaled-down version of the previous monitoring programme for the Lough Leane Project.

- Continued monitoring of effluent quality from municipal wastewater treatment plants and licenced trade discharges throughout the county.
- Implementation of an intensive water quality monitoring programme for the Lough Currane catchment in South County Kerry.
- Biological monitoring (Small Streams Risk Assessment) completed in three river catchments : Cumeragh, Quagmire and Lee.

b) PROBLEMS ENCOUNTERED :

- Analysis capacity restrictions on account of the limited laboratory space available;
- Increasing demands on the laboratory to provide monitoring/analysis services in a number of areas such as drinking water quality, bathing water/"Blue Flag" etc.
- Uncertainty engendered by the late finalization of the River Basin District monitoring programmes.

c) FUTURE PLANS/NEW DIRECTIONS :

- Expand the laboratory facilities to cater for increasing work load – detailed proposals for a new laboratory have been advanced.
- Secure additional funding to increase laboratory and monitoring staff resources.
- Continue development of the in-house computer based laboratory data storage and handling system - ensure that it is coordinated satisfactorily with EPA and RBD (River based districts) databases.
- Ensure, as resources allow, that monitoring plans for rivers as envisaged in original measures report will be adhered to as much as possible.
- Ensure, as resources allow, that ancillary monitoring be undertaken to support any farm survey work which is being carried out.
- Expand the Small Streams Risk Assessment programme to cover remaining vulnerable catchments. Use the results obtained from this process as an aid to focus additional survey work.

3.4 Public Education and Advisory Measures

a) PROGRESS DURING REPORTING PERIOD :

- Kerry County Council's Environmental Awareness Officer has contributed numerous newspaper articles and has participated in various radio programmes on a range of environmental issues, including water quality.
- Kerry County Council's Environmental Awareness Officer has continued to work with the school sector in the promotion of good environmental practices, particularly through development of the "Green Schools" programme etc.

- Kerry County Council personnel have given lectures on water quality and good farming practice at a large number of REPS courses and to a variety of organisations throughout the county.
- An awareness of the importance of good farm management/practice has been raised by Kerry County Council personnel through the operation of the farm survey programme.
- Kerry County Council personnel have been available at all times to members of the public, local representatives and the media to provide information and deal with queries in relation to water quality in the county.

b) PROBLEMS ENCOUNTERED :

- The work load undertaken by the Environment Protection Section in the areas of environmental regulation and enforcement work has stretched resources at times.

c) FUTURE PLANS/NEW DIRECTIONS :

- Development of a code of best practice for farming activities based on the new European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2006.
- Continued expansion of the water quality public education programme to a county-wide level.
- Increased co-operation between various state agencies active in the water quality management area to improve and coordinate the dissemination of information on water quality issues.

3.5 Other National Agri-environmental and Miscellaneous Measures

a) PROGRESS DURING REPORTING PERIOD :

- Active participation in the new River Basin District management structures – South Western RBD and Shannon RBD.
- Continued implementation of the various Forest Service Guidelines for forestry development and management within County Kerry.
- Continued take-up on the REPS scheme in County Kerry.
- Introduction of the new European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2006.

b) PROBLEMS ENCOUNTERED :

- Ever increasing workload in the environmental area putting strains on resources;

- Uncertainty and confusion generated by the protracted introduction of the EU Nitrates Directive Action Plan.

c) FUTURE PLANS/NEW DIRECTIONS :

- Investigate all possible funding options at local, national and european level to increase the resources available for implementation of the Phosphorous Regulations Measures Report for County Kerry.
- Continue progress on the implementation of the EU Water Framework Directive in conjunction with other local authorities and stakeholders.
- Continue the progress made to date on implementation of the Kerry County Measures Report.

3.6 Summary and Conclusions

a) PROGRESS DURING REPORTING PERIOD :

Kerry County Council has continued to implement the provisions of the County Kerry Measures Report over the course of the 2004-2006 reporting period. The pollution response team has been re-organised and now operates on a revised geographical area basis. Farm survey work has been carried out in a number of additional river catchments and the outputs from this process are being followed up. Efforts have also been re-focused on implementation of the management proposals coming from the Lough Leane Catchment Monitoring and Management Project over the period in question.

b) PROBLEMS ENCOUNTERED :

As in previous periods, while increased resources were targeted at the area, particularly for the farm survey element, these continued to fall short of the levels recommended in the Measures Report for the county. Capacity constraints within the laboratory have also limited the volume of monitoring work which can be undertaken and this has been compounded by the lack of space available. In addition to the above, in common with all local authorities, the volume of work being carried out by the Environmental Services Department has considerably expanded over the reporting period, particularly in the area of waste management, which has correspondingly increased the pressure on already strained resources.

The protracted introduction of the Nitrates Directive action plan also created some difficulty. In particular, uncertainties with regard to the content of the proposed Nitrates Regulations resulted in the stalling and suspension of the Lough Leane Agricultural Bye-Laws adoption process. Uncertainty has also arisen over the status of the Phospohorus Regulations themselves, particularly in light of the specific targets and deadlines set out in the Water Framework Directive.

c) FUTURE PLANS/NEW DIRECTIONS :

The recent introduction of the new European Communities (Good Agricultural Practice for the Protection of Waters) Regulations will present new challenges to local authorities. It is our intention to adapt our current phosphorus regulations work programme in light of this development to ensure the optimum use of resources.

The existing water quality monitoring network, as operated by Kerry County Council, will be amended to take account of the new River Basin District monitoring requirements.

In the area of water quality monitoring, capacity constraints in the laboratory will have to be addressed and, in this regard, it is hoped that development of new or additional laboratory facilities will be progressed in the near future. In the interim, temporary space will be found for laboratory storage in the form of portakabins.

Environment Department,
Kerry County Council,
December, 2006.

TABLE 1.1 : RIVER WATER QUALITY STANDARDS TO BE ACHIEVED BY 2007																			
Local Authority Name	Kerry	Implementation Report Year	2006																
River Name	River Code	Biological Monitoring Station	Station Location Name	Easting	Northing	Baseline Q-value (1996)	1998/2000 Q-values	2001/03 Q-values	2005/06 Q-values	Change in Q status since 1998/2000 (06)	Standard to be Achieved by 2007 Q Value	MRP Value ug/l P (pre 2001)	Mrp value (2001/02)	No of samples(MRP) (2001/2)	Mrp value (2003/04)	No of samples(MRP) (2003/4)	Mrp value (2005/06)	No of samples (MRP) (2005/06)	Standard to be Achieved by 2007 MRP Value
CULLAVAW STREAM	18C04	0100	Cullavaw Br(Upr)	113963.3	92161.6	3-4	4	4	4	no change	4		39	7					30
CULLAVAW STREAM	18C04	0300	Just u/s Blackwater R confl	117033.5	93391.2	4	4	4	4	no change	4		37	6					30
ARDSHEELHANE	21A02	0100	Coomyanna Br	71702.5	72942.7	4-5	4-5	4-5	4-5	no change	4-5		<5	6					20
ARDSHEELHANE	21A02	0200	Just u/s Sneem River confl	68994.5	67714.3	4-5	4-5	3-5	3-5	DET	4-5		<5	6					20
BLACKWATER (KERRY)	21B03	0100	Gearha Bridge	78219	72158.7	4-5	5	5	5	no change	5		2	6					20
BLACKWATER (KERRY)	21B03	0200	SW of Old Dromore House	79132.7	70123.4	4-5	4-5	5	5	IMP	5		2	6					20
CLEADY	21C02	0300	Cleady Bridge	94328.3	72218.5	4	4	4	4	no change	4		8	12					20
CUMMERAGH	21C04	0200	Just d/s Derriana Lough	60008	72666.7	4	4	4	4	no change	4		2	6					20
CUMMERAGH	21C04	0400	Fords d/s Cummeragh Bridge	58553	71878	4	4	4	4	no change	4		2	11					20
CUMMERAGH	21C04	0600	Dromkeare Bridge	54522.6	68515.1	4	4	4-5	4-5	IMP	4-5		2	11	8	251	14	100	20
CROANSHAGH	21C05	0100	Glanmore Bridge	77220.8	55754.5	4-5	4-5	4-5	4-5	no change	4-5		6	5					20
CROANSHAGH	21C05	0200	Croanshagh Bridge	77115.8	57279	4	4	4	4	no change	4		8	6					20
CLOONEE (KERRY)	21C06	0100	Just u/s Inchiquin Lough	85359.4	62277.4	4	4-5	4	4	DET	4 -5		8	12					20
CLOONEE (KERRY)	21C06	0200	Just d/s Inchiquin Lough	83529.1	63552.2	3-4	4	3-5	3-5	DET	4		6	12					20
CLOONEE (KERRY)	21C06	0400	Casha Bridge	79347.4	63498.8	3-4	3-4	3-4	3-4	no change	4		7	13					20
COOMEELAN STREAM	21C14	0200	Br u/s Sheen R confl	95784.4	63894.7	4-5	4-5	4-5	4-5	no change	4-5		14	6					20
DRIMMINBOY	21D01	0100	Br SE of Shronebirrane	76093.4	55869.5	4-5	4	4	4	no change	4-5		4	6					20
DERREENDARRAGH	21D03	0300	Br near Derreendarragh	79531	72584.2	4-5	4-5	4-5	4-5	no change	4-5		6	6					20
DRUMOGHTY	21D04	0400	Dawros Br	87697.2	67760.3	4	4	4	4	no change	4		10	12					20
EMLAGHMORE	21E01	0400	Emlaghmore Br	44582.7	68780.2	3	3	3-4	3-4	IMP	4		9	12	3	5	7	7	20
FINNIHY	21F01	0200	Br u/s Sahaleen Bridge	86169	75524	4	4	4	4	no change	4		5	12					20
FINNIHY	21F01	0300	Sahaleen Bridge	89991.9	73355.4	4	4	4	4	no change	4		9	12					20
FINNIHY	21F01	0500	Kenmare: Finnihy Br (RHS)	90919.4	71117.3	4	4	3-4	3-4	DET	4		7	11					20
FINNIHY	21F01	0510	Kenmare: Finnihy Br (LHS)	90957	71129.8	3-4	3-4	3-4	3-4	no change	4		10	8					20
INNY (KERRY)	21I01	0300	Ballynakilly Bridge	61532	77146	4	4	4	4	no change	4		2	7					20
INNY (KERRY)	21I01	0400	Killeenagh Bridge	57905	74577	4	4	4	4	no change	4		2	12					20
INNY (KERRY)	21I01	0500	Foildrenagh Bridge	55743	72856	3-4	3-4	4	4	IMP	4		2	11					20
INNY (KERRY)	21I01	0900	2km u/s Inny Bridge	51802	70296	4	3-4	4	4	IMP	4		4	13					20
KNAGAHINY LOUGH STREA	21I03	0100	Br NW of Caunteens	59731.7	65627	4-5	4	4	4	no change	4-5		4	6					20
KEALDUFF	21K01	0100	Br near Gearha	78194.1	72146.9	4-5	4-5	4	4	DET	4-5		5	6					20
OWBEG (ROUGHTY)	21O02	0200	Mangerton Bridge	99487.5	76168.5	4-5	4-5	4-5	4-5	no change	4-5		10	12					20
OWBEG (ROUGHTY)	21O02	0500	Ardtully Bridge	98741.6	73313	4-5	4	4-5	4-5	IMP	4-5		26	12					20
OWREAGH	21O05	0100	Br S of Coomnahorna	64850.9	66119.4	5	4-5	4	4	DET	5		7	6					15

OWREAGH	21O05	0300	Br W of Sneem	68036.9	66699.4	4-5	4-5	4	4	DET	4-5		4	6					20
OWROE	21O06	0100	Third Br u/s Owroe Bridge	61673.3	79263.3	4-5	4-5	4-5	4-5	no change	4-5		2	5					20
OWROE	21O06	0200	Owroe Bridge	61197.7	77399.7	4	4	4	4	no change	4		2	5					20
OWENSHAGH	21O08	0100	Lauragh Bridge	77845.4	58530.6	4	4	4	4	no change	4		10	6					20
ROUGHTY	21R01	0020	Br near Knockanruddig	108766.9	70908.8	4-5	4-5	4-5	4-5	no change	4-5		10	6					20
ROUGHTY	21R01	0060	Inchee Bridge (RHS)	107756.8	73875.8	4-5	4-5	4-5	4-5	no change	4-5		7	9					20
ROUGHTY	21R01	0070	Inchee Bridge (LHS)	107709.2	73915.4	4-5	4-5	4-5	4-5	no change	4-5		4	10					20
ROUGHTY	21R01	0100	Morley's Bridge	104819.8	75374.6	4-5	4-5	4-5	4-5	no change	4-5		7	7					20
ROUGHTY	21R01	0250	Br (Ford) d/s Slaheny R	100069.9	72955.5	4	4	4	4	no change	4		8	6					20
ROUGHTY	21R01	0350	Ford NW of Kilgortaree Ho	96031.6	72122.4	4	4	4	4	no change	4		12	10					20
SHEEN	21S01	0100	Releagh Bridge	92334.1	62925.3	4-5	4-5	5	5	IMP	5		8	12					20
SHEEN	21S01	0400	Ford d/s Dromagorteen Bridge	95182.2	65064	4-5	4-5	4-5	4-5	no change	4-5		8	12					20
SHEEN	21S01	0600	Dromanassig Bridge	95281.7	67975.9	4	-	4-5	4-5	IMP	4-5								20
SHEEN	21S01	0700	1.1km u/s Sheen Br	93034.7	69710.7	4	4	4	4	no change	4		10	12					20
SLAHENY	21S02	0300	Ford NE of Shandrum	101675.4	70012.5	4-5	4-5	4-5	4-5	no change	4-5		8	6					20
SLAHENY	21S02	0500	Coolyard Bridge	100380.8	72726.6	4-5	4	4-5	4-5	IMP	4-5		10	12					20
SNEEM	21S03	0200	Br E of Dromtine Lough	67042.3	69856.1	4-5	4-5	4-5	4-5	no change	4-5		5	6					20
SNEEM	21S03	0400	Br u/s Ardsheelhane River	68922.8	67524	4-5	4-5	4-5	4-5	no change	4-5		6	6					20
TAHILLA	21T01	0200	Tahilla Br	74403	65745.7	4-5	3	3	4	IMP	4-5		6	6					20
BEHEENAGH	22B01	0400	Br N of Gortderrig	112038	87559	4-5	4	3-5	4	no change	4-5		5	5					20
BEHEENAGH	22B01	0600	Br u/s Owneykeagh River	109712	90939	4	4	4	4-5	IMP	4	16	15	23					20
BEHY (KERRY)	22B02	0300	Br W of Ballynakilly Br	63960	87834	4	4	4	4-5	IMP	4		<5	8					20
BEHY (KERRY)	22B02	0400	First Br d/s Coomaglaslaw L	62187.1	86972.2	4	4-5	4-5	4-5	no change	4-5		<5	8					20
BEHY (KERRY)	22B02	0800	Second Br d/s Coomasaharn L	63988	85622	4	4	4	4-5	IMP	4		5	9					20
BEHY (KERRY)	22B02	1000	Ballynakilly Bridge	64423	87855	4	4-5	4-5	4-5	no change	4-5		2	8					20
BEHY (KERRY)	22B02	1300	Behy Bridge	66491	90829	4-5	4-5	4-5	4-5	no change	4-5		2	9					20
BROWN FLESK	22B03	0050	Br u/s Barna Stream confl	109512.5	103756.2	4-5	4-5	4	4	DET	4-5								20
BROWN FLESK	22B03	0100	Rice Bridge	105800	103200	3-4	3-4	4	4	IMP	4	20	16	13	11	15	18	20	30
BROWN FLESK	22B03	0200	Twiss Bridge	104300	103300	4	3-4	4	3-4	DET	4								30
BROWN FLESK	22B03	0300	Flesk Bridge - Currow	97700	104500	3-4	4	4-5	4	no change	4-5	20	12	14	16	15	21	20	20
BROWN FLESK	22B03	0400	O'Connell Bridge	95100	104500	3-4	4	4-5	4	no change	4-5	23	16	13	16	15	24	20	20
BROWN FLESK	22B03	0500	Br u/s Maine River confl	93100	105700	4		4	4-5	IMP	4	24	16	15	15	15	18	20	20
CARAGH	22C02	0200	Br SW of Cloghfune	76786	81104.2	4	4-5	4-5	4	DET	4-5		7	7					20
CARAGH	22C02	0400	Foot-bridge d/s Owenroe R confl	72134.2	81556.6	4-5	4-5	4-5	4-5	no change	4-5		2	7					20
CARAGH	22C02	0600	Blackstones Bridge	70960.2	86371.7	5	5	5	5	no change	5	10	2	22					15
CARAGH	22C02	0680	1.2km u/s Caragh Br	71368.2	92400.6	3-4	3-4	3-4	3-4	DET	4	5	2	26					20
CARHAN	22C03	0090	Br u/s Br N of Canburrin	50519.9	75553	4	-	-	3-4	no change	4								20
CARHAN	22C03	0100	Br N of Canburrin	51044.2	77152.3	3-4	3-4	3-4	3-4	no change	4		7	8					20
CARHAN	22C03	0200	Foot-bridge S of Bahagh	51259.1	79052.8	4	4	3-4	4	no change	4		2	7					20
COTTONER'S (LAUNE)	22C05	0100	Br W of Breanlee	76790	86769	4-5	4-5	4-5	4-5	no change	4-5		2	7					20
COTTONER'S (LAUNE)	22C05	0400	Br N of Glancuttaun Lower	77804	91580	4-5	4-5	4-5	4-5	no change	4-5		7	7					20
COTTONER'S (LAUNE)	22C05	0600	Br u/s Laune R confl	78559	95477	3-4	3-4	3-4	4	IMP	4		6	19	4	12	9	10	20
COOMNACARRIG	22C06	0300	Dromalonhurt Bridge	69736.5	81726	4-5	4-5	4-5	4-5	no change	4-5		8	6					20
CRINNAGH	22C07	0200	Cromaglan Bridge	92840.4	82619.8	5	5	5	5	no change	5		6	2					15
CROAGHANE	22C09	0100	Sheheree Bridge	106359.5	109813.3	4	4	4	4	no change	4		9	7					20
DEENAGH	22D01	0045	Br NE of Tulloram	100946	93764	3	3	3	3	no change	3-4				13	13	14	13	50

DEENAGH	22D01	0100	Br near Woodpark	98800	93400	4-5	4	4	4	no change	4-5	16	20	20					20
DEENAGH	22D01	0200	Deenagh Bridge	95959.9	91932.7	4	4	4	4	no change	4	19	16	22	15	13	11	13	20
DEENAGH	22D01	0600	Br just u/s L Leane	94729	90167	4	4	4	4-5	IMP	4	12	26	16	12	66	14	116	20
DERREEN (KERRY)	22D02	0100	Derreen Br	46487	72492	4	4	4	4	no change	4		9	6					20
DOGUE	22D03	0300	Ford d/s Carker Branch confl	104081.8	101360.4	4	4	4	4	no change	4		22	6					30
DOGUE	22D03	0400	Br u/s Brown Flesk confl	102082.6	102312.2	4	4	4	4	no change	4		14	6					20
EMLAGH	22E01	0200	Br W of Emlagh	64829.6	103278.5	4-5	4-5	4-5	4-5	no change	4-5		14	6					20
EMLAGH	22E01	0400	Br S of Ballycullane	65676.3	101291.8	4-5	4-5	4-5	4-5	no change	4-5		22	7					20
FERTA	22F01	0100	Br WSW of Coulagh	57024.2	83299.7	4-5	4-5	4-5	4-5	no change	4-5		2	11					20
FERTA	22F01	0500	Br at Toon	56270	82176.1	4	4-5	4-5	4-5	no change	4-5		2	12					20
FERTA	22F01	0700	Br ENE of Derreenmoira	54888.5	82225.9	4	4	4	4	no change	4		5	7					20
FERTA	22F01	1000	Deelis Bridge	50811.7	81601.6	3-4	3-4	3	3	DET	4		10	12					20
FLESK (KERRY)	22F02	0010	6km d/s Fords NW of Cummeenabuddo	119122	83666	5	3-4	4	4	IMP	5		2	52					15
FLESK (KERRY)	22F02	0040	Br near Clydagh Lodge	111246.8	82664.8	4-5	4-5	4	4-5	no change	4-5		2	89	5	72	8	21	20
FLESK (KERRY)	22F02	0060	Poulgorm Bridge	109778.9	81882	5	5	5	5	no change	5	5	2	20	2	8	< 5	13	15
FLESK (KERRY)	22F02	0100	Br near Glenflesk	106600	85400	5	5	5	5	no change	5	5	4	20					15
FLESK (KERRY)	22F02	0200	Flesk Bridge - Gortahoosh	103619	87669	4	4	4	4	no change	4	10	9	29					20
FLESK (KERRY)	22F02	0250	Ford NE of Faghcullia	100224.7	87987.8	4-5	4-5	4	4-5	no change	4-5								20
FLESK (KERRY)	22F02	0300	Flesk Br - S of Killarney LHS	96662.2	89408.6	4-5	4	3-4	4	no change	4-5	10	9	63	7	9			20
FLESK (KERRY)	22F02	0310	Flesk Br - S of Killarney RHS	96670.7	89484.3	4-5	3-4	3-4	4	IMP	4-5	10	9	21	6	9	8	96	20
FINGLAS (LAUNE)	22F03	0400	Cappagh Bridge	81059	91376.3	4-5	4	4	4-5	IMP	4-5		16	7					20
FINGLAS (LAUNE)	22F03	0700	Meanus Bridge	80386	93931.4	4-5	4	4	4-5	IMP	4-5		36	7					20
FINOW	22F04	0100	Br 0.3km u/s L Guitane	103129	82220	5	5	5		no change	5		2	74					15
FINOW	22F04	0300	Br (Ford) u/s Flesk River	100856.2	87369.6	4-5	4-5	4-5	4-5	no change	4-5	5	6	16					20
FAHADUFF	22F09	0200	Br NE of Portduff	100756.4	113462.1	4	4	4	4	no change	4-5		58	13					30
FAHADUFF	22F09	0400	Br u/s Maine R confl	98790.9	110261.9	3-4	4	4	4	no change	4		67	13					30
GADDAGH	22G01	0300	Ford SW of Gortboy	83096.7	89145.7	4-5	5	4-5	4-5	DET	4-5		2	7					20
GADDAGH	22G01	0400	Gaddagh Bridge	83818	91590	4-5	4-5	4	4	DET	4-5		6	8					20
GADDAGH	22G01	0500	Gortnaskarry Br	83729	93361	4	3-4	3-4	3-4	no change	4		6	20	8	15	11	12	20
GEARHAMEEN	22G03	0100	Br N of Cockow	82429.7	80968.7	4	4-5	4-5	4-5	no change	4-5		2	5					20
GEARHAMEEN	22G03	0300	Br u/s Owenreagh R confl	87494.7	82177.1	4-5	4-5	4-5	4-5	no change	4-5		4	6					20
GWEESTIN	22G06	0300	Dooneen Br	96952	97725	4	4-5	4	4	no change	4-5		9	14					20
GWEESTIN	22G06	0600	Gweestin Bridge	92380	98208	3-4	3-4	4	4	IMP	4		32	17					30
GWEESTIN	22G06	0900	Br u/s Listry Br	87641	97729	4	4	4	4	no change	4		30	14					30
GWEESTIN	22G06	1200	Gweestin Bridge	83829	94973	2-3	3	3	3	no change	3-5	37	27	24	25	13	20	11	50
GLANTANE	22G07	0200	Leaha Bridge	107164.5	104757.9	4	4	4-5	4	IMP	4-5		15	5					20
GROIN	22G08	0300	Br E of White Gate Cross Rds	78924.5	103879.9	4-5	4	4-5	4	no change	4-5		5	7					20
LAUNE	22L01	0100	Laune Br	89206.8	91114.9	3-4	3-4	4	4	IMP	4		5	79	2	136	7	106	20
LAUNE	22L01	0200	Beaufort Bridge	88143.1	92625.7	4	4	4	4	no change	4		6	14	6	15	12	12	20
LAUNE	22L01	0300	Ballymalis Castle	83907.4	93823.4	4	4	4	4	no change	4		6	14	6	15	12	12	20
LAUNE	22L01	0400	1.5km d/s Gweestin R confl	82238	95740.7	3-4	3-4	3-4	4	IMP	4		8	8	18	15	16	10	20
LITTLE MAINE	22L02	0500	Br near Fairy Gate			4-5	4	4	3-5	DET	4-5								20
LITTLE MAINE	22L02	1000	0.1km d/s Br u/s Maine R confl	93241	109515.3	4	3-4	4	4	IMP	4		15	12	18	14	19	17	20
LOE	22L03	0100	Br just d/s Black Lake	87690.6	87797.3	4-5	4-5	5	4-5	no change	5								20
LOE	22L03	0400	Br u/s Laune R confl	87976.6	90810.5	4	4	4	4-5	IMP	4		2	13	10	13	9	12	20

LOO	22L04	0100	Agnanus Br	104520	78867	4	4	4	4	no change	4		2	9					20
LOO	22L04	0400	Loo Bridge	108601	81343	4	3-4	4	4	IMP	4	5	2	23	2	12	<5	12	20
MAINE	22M01	0200	(E) Br S of Castleisland	99665	109477	3-4	3	4	3-4	no change	4	41	28	14	34	15	30	20	30
MAINE	22M01	0400	Br 2km d/s Castleisland	97900	109300	3	3	3-5	3-5	IMP	3-4	61	50	14	64	15	57	20	50
MAINE	22M01	0500	Br NW of Currans	92589.3	106135.1	3-4	3-4	4	4	IMP	4	47	34	14	58	15	35	19	30
MAINE	22M01	0600	Maine Br - Currans	93837.7	106385.5	3-4	-	-	3-5	no change	4	32	19	14	31	15	28	21	30
MAINE	22M01	0700	Maine Br - Lower	89100	104800	3-4	4	4	3-5	DET	4		23	14	26	15	24	21	30
MEELAGH	22M02	0100	Br u/s Caragh R confl	69979	86247	4-5	4-5	4-5	4	DET	4-5	5	2	13					20
MILLTOWN (KERRY)	22M03	0110	Br W of Glens Br			4	4	3-4	3-4	DET	4		10	4					20
MILLTOWN (KERRY)	22M03	0200	Br d/s Glens Br	42900.8	101570.5	4	4	3	2	DET	4		9	11					20
MILLTOWN (KERRY)	22M03	0300	Ford E of Kilfountan	42830.9	102307	3	3	3	2-5	DET	3-4		28	13					50
OWENALONDRIG	22O01	0200	Br d/s Fairy Glen	53698.2	101908.1	4	4	4	4	no change	4		5	13					20
OWENALONDRIG	22O01	0500	Br in Foheraghmore	49761.6	100664	3-4	4	3	2	DET	4		31	13					20
OWENASCAUL	22O02	0800	Br 1.6km u/s Anascaul	59380.3	103281.8	4-5	4-5	4	4	DET	4-5		13	13					20
OWENASCAUL	22O02	1000	Br 1.3km d/s Anascaul	59360.9	100984.6	4-5	4-5	4	4-5	IMP	4-5		23	13					20
OWENREAGH	22O03	0100	Br E of Greagnagreana	88423.6	82103.2	4-5	4-5	4-5	4-5	no change	4-5		2	6					20
OWENREAGH	22O03	0200	Just u/s trib from Looscaunagh L	87672.3	79558.4	4-5	4-5	4-5	5	IMP	4-5		2	6					20
OWENREAGH	22O03	0400	Br u/s Upper Lake	88065	80965	5	5	5	4-5	DET	5		2	6					15
OWENROE (CARAGH)	22O04	0200	1.1km u/s Caragh R confl	72735.3	80373.5	4	4-5	4-5	4-5	no change	4-5		25	7					20
OWNEYKEAGH	22O05	0200	Br WNW of Drom	108059.3	88573.3	4-5	4-5	4	4	DET	4-5	26	22	24					20
OWNEYKEAGH	22O05	0400	Br u/s Flesk R confl	106820.2	86932	4-5	4-5	4	4-5	no change	4-5	25	18	24	8	9	12	6	20
OWGARRIFF (FINOW)	22O06	0100	Owgarriff Bridge	100635.7	85961	4-5	4	4-5	4-5	IMP	4-5	5	4	18					20
QUAGMIRE	22Q01	0200	Br d/s Tooreennamult Br	110360.9	98383.4	4-5	4-5	4-5	4	DET	4-5		14	5					20
QUAGMIRE	22Q01	0400	Annagh Bridge	109638	94985	4	4-5	4	4	DET	4-5		35	5					30
QUAGMIRE	22Q01	0500	0.5km u/s Owneykeagh R confl	108464	91864	4-5	-	-			4-5	28	18	15					20
SHANOWEN (KERRY)	22S01	0020	Second Br d/s Cloone R confl	103387.4	108994.3	3	3-4	3-4	4	IMP	4		50	12					30
SHANOWEN (KERRY)	22S01	0100	Ford (Br) u/s Maine R confl	101316.3	109066.7	4	4	2-3	4	no change	4	50	42	27	43	15	29	20	30
WOODFORD	22W01	0300	Woodford Bridge u/s Flesk confluenc	99235.2	90417.3					no change	4		19	16	24	4			20
BRICK	23B03	0100	Br S.E. of Glanballyma	91653	123765	4-5	4	4	4	no change	4-5		23	8					20

BRICK	23B03	0300	Shanow Br	86409	123637	4	4	4	4	no change	4		40	15					30
BRICK	23B03	0400	Br W. of Garrynagore	87810	125476	3-4	3-4	3	3-5	no change	4		44	16					30
BRICK	23B03	0700	Ballinagare br	88684	132405					no change			68	14	66	14	54	20	30
CLYDAGH (FEALE)	23C03	0200	Scalp Bridge	111999	114549	4-5	4	4-5	4	no change	4-5		5	7					20
CLYDAGH (FEALE)	23C03	0400	Bridge W. of Brosna	113213.3	118600.9	4	-	-		no change	4		14	7					20
CLYDAGH (FEALE)	23C03	0500	Clydagh Bridge	113718.7	119986.9	4-5	4	4	4	no change	4-5		17	7					20
CLOGHANE(OWENMORE)	23C08	0200	0.5 km d/s Lough Gal	48614.4	106914.1	4-5	4-5	4-5	4	DET	5		6	7					20
FEALE	23F01	0400	2.3 km d/s Bridge in Abbeyfeale	109487.3	128068.6	3-4	3-4	3-4	4	no change	4		21	15	16	14	19	20	30
FEALE	23F01	0100	Mountcollins bridge	115800	118700	4	4	4		no change	4-5		12	16	12	15	11	21	20
FEALE	23F01	0120	Just d/s Caher R confl	115716.5	118940.9	4	4	4	4	no change	4								30
FEALE	23F01	0200	Wellesley Bridge	109624.7	123137.4	4-5	4-5	4-5	4	DET	4-5	12	17	15	16	15	18	21	20
FEALE	23F01	0310	0.2km d/s Abbeyfeale Br (RHS)	111337.3	127128.3	2	3	2-3	4	IMP	3		20	17					30
FEALE	23F01	0320	0.2km d/s Abbeyfeale Br (LHS)	111321.5	127120.4	4	4	4	4	no change	4								30
FEALE	23F01	0500	Br E.N.E. of Duagh Ho	107200	130600	4	4	4	4	no change	4-5	18	24	16	19	12	18	21	30
FEALE	23F01	0550	Trieneragh	103245.1	133125.9	4	4	4-5	4	no change	4-5	17	22	14	15	15	20	20	30
FEALE	23F01	0600	Listowel Bridge	99500	133300	3-4	4	3.5	4	IMP	4	14	23	20	18	17	20	21	30
FEALE	23F01	0700	2 km d/s Listowel (RHS)	97350.6	133159.8	3	3	3	3	no change	3-4	25	34	13	24	14	23	21	30
FEALE	23F01	0710	2 km d/s Listowel (LHS)	97432	133116	3-4	4	4	4	no change	4								30
FEALE	23F01	0725	0.1km d/s Racecourse Foot-bridge	98021.1	133426.3	3-4	3-4	3-4	4	IMP	4								30
FEALE	23F01	0800	Finuge Bridge	95144.3	132100	3	3	3-4	3-5	IMP	3-4	109	40	47	32	57	31	31	50
FEOHANAGH	23F02	0100	Ballybrack Br.	42077.3	108871.4	5	5	4-5	4	DET	5		6	7					15
FEOHANAGH	23F02	0500	Br at Feohanagh	39420.1	109830.6	4	4	4-5	4	no change	4-5		10	7					20
FINGLAS	23F03	0400	Br d/s Curraduff Br	69856.3	109745.8	5	4-5	4-5	5	IMP	5		12	6					15
GALEY	23G01	0300	Ahavoher Bridge	106899	137076	3-4	3-4	3-4	4	IMP	4		38	16	32	5	34	11	30
GALEY	23G01	0400	Galey Bridge	104412.4	138375	3-4	3-4	3-4	3-4	no change	4		46	15	42	5	44	11	30
GALEY	23G01	0450	Bridge S.W. of Pollagh	101243	139559	4	4	3-5	3-5	DET	4		72	16	55	5	46	11	30
GALEY	23G01	0500	Shrone Bridge	97819	137212.4	3	3-4	4	4	IMP	4		76	16	64	5	60	11	50
GALEY	23G01	0700	Br 4.4 km u/s Feale River	94181	134356.5	3	3	3	3	no change	3-4		71	13	67	5	56	10	50
GLASHACOONCORE	23G02	0100	Br WSW of Meenyvoughaun	109148.4	119305.6	4-5	4	4	4	no change	4-5		9	7					20
GLASHACOONCORE	23G02	0200	Glashacooncore Bridge	110976.1	121397.9	4	4	4	4	no change	4-5		25	7					30
GLASHOREAG	23G03	0200	Ivy Bridge	97344.6	119651.5	4	3-4	4	4-5	IMP	4-5		8	7					20
GLENNAHOO	23G05	0200	Br u/s Scorid R confl	53816.9	111285.4	4-5	4-5	4-5	3-5	DET	4-5		5	7					20
LEE (TRALEE)	23L01	0030	Ahnambraher Bridge (Rhs)	89721.1	114361.8	2	3	2	3-5	IMP	3-5		97	13					50
LEE (TRALEE)	23L01	0035	Ahnambraher Bridge (LHS)	89737	114480.8	4	3	3-5	3-5	IMP	4		72	7					30
LEE (TRALEE)	23L01	0050	Bridge S.E. of Caherbreagh	88156.3	112905.7	4	3-4	3-4	4	IMP	4		88	13					30

LEE (TRALEE)	23L01	0100	2nd Br d/s Ballymullen Mills	81548.9	113092.5	3	3	2-3	3	no change	3-4		64	15					50
LYRACRUMPANE	23L02	0100	Bridge u/s Smearlagh River	98077.9	123157.7	4	4	4	4-5	IMP	4		6	7					20
MILLTOWN HOUSE STREAM	23M04	0100	Br E of Milltown Ho	84347.5	122537.4	3	4	3	4	no change	4		49	17					50
OWENCASHLA	23O02	0300	First Bridge u/s Sea	64708.3	111356.5	4-5	4-5	4	4	DET	4-5		13	6					20
OWENMORE (KERRY)	23O03	0100	Bridge d/s Lough Cruttia	49114.8	108405.6	5	4-5	5	4-5	no change	5		9	7					15
OWENMORE (KERRY)	23O03	0300	Bridge at Boherboy	51269.9	110721.9	5	5	5	5	no change	5		7	7					15
OWENNAFEANA	23O04	0100	Teer Bridge	51731.4	113919.1	4-5	4-5	4-5	4	DET	4-5		7	7					20
OWVEG (KERRY)	23O05	0200	Owveg Bridge	107184.4	119499	4	4	4	4	no change	4		12	7					20
OWVEG (KERRY)	23O05	0350	Ford just d/s Tullaleague R	107136.4	120483.1	4	4	4	4	no change	4		19	7					20
OWVEG (KERRY)	23O05	0500	Bateman's Bridge	108637	123325	4	4	4	4	no change	4		22	7					30
SCORID	23S01	0200	Ford d/s Kilmore Br	53434.8	110808.8	4-5	4-5	4-5	4-5	no change	4-5		2	7					20
SMEARLAGH	23S02	0300	Br SE of Reanagowan Crossroads	97581	118942	4-5	4	4	4-5	IMP	4-5		14	7					20
SMEARLAGH	23S02	0400	Br u/s Lyracrumpane River	98368	123223	4-5	4-5	4-5	4-5	no change	4-5		11	7					20
SMEARLAGH	23S02	0500	Bridge N.E. of Gortacloghane	101350	126622	4	4	4	4	no change	4		12	8					20
SMEARLAGH	23S02	0700	Ford u/s Feale River confl [LHS]	102500	132391	4	4	4	4	no change	4	23	26	17	11	9			30
SMEARLAGH	23S02	0710	Ford u/s Feale River confl [RHS]	102512	132391	4	4	4	4	no change	4		28	11	18	10	27	17	30
TULLALEAGUE	23T01	0100	Talbot's Bridge	105846.9	119464.1	3-4	3-4	3-4	3-5	no change	4		28	13					30
TYSHE	23T02	0100	Monoona Bridge	78769.7	121221.2	3	-	-		no change	3-4		274	13					50
TYSHE	23T02	0400	West Bridge. Ardfert	78402	121219	3	3	3	3	no change	3-4		179	13					50
TYSHE	23T02	0500	Bridge near Banna House	76281.8	123108.6	3	-	-		no change	3-4		151	13					50
TARMON STREAM	23T03	0500	Gabbet's Br	101836	140132	3	3	3	3	no change	3-4		126	16			113	10	50
BALLYLONGFORD	24B03	0300	Br N of Kilgarvan	96002.7	141854.6	3-4	4	4	4	no change	4		26	16	22	5	32	10	30
BALLYLONGFORD	24B03	0400	Br SW of Shrone	98248.4	141886.4	1-2	2-3	2-3	2-3	no change	3		86	16	90	5	106	10	70
BALLYLONGFORD	24B03	0700	Gortanacooka Bridge	99293.2	143399.9	3	3	3-4	3-4	IMP	3-4		94	16	134	5	96	10	50
TARBERT	24T01	0100	(West) Br in Tarbert	106485.6	147768	3	3	3	3	no change	3-4		134	12			114	11	50

Has Either Standard Been Achieved? (06)	Does an Article 3(9) Extension Apply?	If Yes, What is the revised compliance date	River Name	Where Quality is Unsatisfactory What is the Principal Source of Pollution	If there is an identifiable source, please enter details
yes(Q)			CULLAVAW STREAM	agricultural runoff	
yes(Q)			CULLAVAW STREAM	agricultural runoff	
Yes			ARDSHEELHANE		
yes(P)			ARDSHEELHANE	afforestation, septic tanks	
Yes			BLACKWATER (KERRY)		
Yes			BLACKWATER (KERRY)		
Yes			CLEADY		
Yes			CUMMERAGH		
Yes			CUMMERAGH		
Yes			CUMMERAGH		
Yes			CROANSHAGH		
Yes			CROANSHAGH		
yes(P)			CLOONEE (KERRY)		
yes(P)			CLOONEE (KERRY)	afforestation	
yes(P)			CLOONEE (KERRY)	afforestation	
Yes			COOMEELAN STREAM		
yes(P)			DRIMMINBOY	afforestation	
Yes			DERREENDARRAGH		
Yes			DRUMOGHTY		
yes(P)			EMLAGHMORE	agricultural runoff	Farm been investigated u/s of this point
Yes			FINNIHY		
Yes			FINNIHY		
Yes			FINNIHY		
yes(P)			FINNIHY	stormwater runoff	run off from domestic dwellings/guest houses in town
Yes			INNY (KERRY)		
Yes			INNY (KERRY)		
yes(P)			INNY (KERRY)	agricultural Runoff/afforestation	
yes(P)			INNY (KERRY)	agricultural Runoff/afforestation	
yes(P)			ISKNAGAHINY LOUGH STREAM	afforestation	
Yes			KEALDUFF		
Yes			OWBEG (ROUGHTY)		
yes(Q)			OWBEG (ROUGHTY)	afforestation	
yes(P)			OWREAGH	afforestation	

yes(P)			OWREAGH	afforestatior	
Yes			OWROE		
Yes			OWROE		
Yes			OWENSHAGH		
Yes			ROUGHTY		
Yes			ROUGHTY		
Yes			ROUGHTY		
Yes			ROUGHTY		
Yes			ROUGHTY		
Yes			ROUGHTY		
Yes			SHEEN		
Yes			SHEEN		
Yes			SHEEN		
Yes			SHEEN		
Yes			SLAHENY		
Yes			SLAHENY		
Yes			SNEEM		
Yes			SNEEM		
yes(P)			TAHILLA	afforestatior	
yes(P)			BEHEENAGH	Agricultural runoff	Farm surveys beer conducted in area
Yes			BEHEENAGH		
Yes			BEHY (KERRY)		
Yes			BEHY (KERRY)		
Yes			BEHY (KERRY)		
Yes			BEHY (KERRY)		
Yes			BEHY (KERRY)		
Yes(P)			BROWN FLESK		
Yes			BROWN FLESK		
no			BROWN FLESK	agricultural runoff	
no			BROWN FLESK		
no			BROWN FLESK		
Yes			BROWN FLESK		
yes(P)			CARAGH		
Yes			CARAGH		
Yes			CARAGH		
yes(P)			CARAGH	agricultural Runoff/Septic tanks	septic tanks from houses/premises at perimeter of lake
no			CARHAN	afforestatior	
yes(P)			CARHAN	afforestation	extensive forestry development u/s of this point
Yes			CARHAN	afforestation	extensive forestry development u/s of this point
Yes			COTTONER'S (LAUNE)		
Yes			COTTONER'S (LAUNE)		
Yes			COTTONER'S (LAUNE)	agricultural runoff	
Yes			COOMNACARRIG		
Yes			CRINNAGH		
Yes			CROAGHANE		
yes(P)			DEENAGH	agricultural runoff	

yes(P)			DEENAGH	agricultural runoff	
Yes			DEENAGH		
Yes			DEENAGH	agricultural runoff	
Yes			DERREEN (KERRY)		
Yes			DOGUE		
Yes			DOGUE		
Yes			EMLAGH		
Yes			EMLAGH		
Yes			FERTA		
Yes			FERTA		
Yes			FERTA		
yes(P)			FERTA	other	possible gravel abstraction
yes(P)			FLESK (KERRY)	afforestatior	
Yes			FLESK (KERRY)	afforestatior	
Yes			FLESK (KERRY)		
Yes			FLESK (KERRY)		
Yes			FLESK (KERRY)		
Yes			FLESK (KERRY)		
yes(P)			FLESK (KERRY)	agricultural runoff/storm water runoff	
yes(P)			FLESK (KERRY)	agricultural runoff/storm water runoff	
Yes			FINGLAS (LAUNE)	septic tanks	
yes(Q)			FINGLAS (LAUNE)	agricultural runoff	
Yes			FINOW		
Yes			FINOW		
no			FAHADUFF	agricultural runoff	
yes(Q)			FAHADUFF	agricultural runoff	
Yes			GADDAGH		
yes(P)			GADDAGH		
yes(P)			GADDAGH	agricultural runoff	
Yes			GEARHAMEEN		
Yes			GEARHAMEEN		
Yes(P)			GWEESTIN	agricultural runoff	
yes(Q)			GWEESTIN	agricultural runoff	
Yes			GWEESTIN		
Yes(P)			GWEESTIN	agricultural runoff	
Yes(P)			GLANTANE		
yes(P)			GROIN	agricultural runoff/septic tanks	
Yes			LAUNE		
Yes			LAUNE		
Yes			LAUNE		
Yes			LAUNE	agricultural runoff	
no			LITTLE MAINE	agricultural runoff	
Yes			LITTLE MAINE		
Yes (P)			LOE		
Yes			LOE		

Yes			LOO		
Yes			LOO		
no			MAINE	urban stormwater overflows	Castleisland urban area
yes(Q)			MAINE	agricultural runoff	
yes(Q)			MAINE	agricultural runoff	
yes(P)			MAINE	agricultural runoff	
Yes(P)			MAINE		
Yes(P)			MEELAGH		
yes(P)			MILLTOWN (KERRY)	agricultural runoff	farms been currently investigated
yes(P)			MILLTOWN (KERRY)	agricultural runoff	farms been currently investigated
no			MILLTOWN (KERRY)	agricultural runoff	farms been currently investigated
Yes			OWENALONDRIG		
No			OWENALONDRIG	agricultural runoff	farm waste entering river 100 m upstream?
yes(P)			OWENASCAUL	agricultural runoff	
yes(Q)			OWENASCAUL	small scale sewage works	Annascaul
Yes			OWENREAGH		
Yes			OWENREAGH		
Yes(P)			OWENREAGH		
yes(Q)			OWENROE (CARAGH)	septic tanks	
yes(Q)			OWNEYKEAGH	agricultural runoff/urban run off	Barraduff village
Yes			OWNEYKEAGH		
Yes			OWGARRIFF (FINOW)		
Yes(P)			QUAGMIRE	agricultural runoff/small scale sewage	Gneeguilla Treatment plant
no			QUAGMIRE	agricultural runoff/small scale sewage	Gneeguilla Treatment plant
yes(P)			QUAGMIRE	agricultural runoff	
yes(Q)			SHANOWEN (KERRY)	agricultural runoff	
yes			SHANOWEN (KERRY)	agricultural runoff	
yes(P)			WOODFORD	agricultural runoff/other	farm inspections will be conducted in area in area - also impact from old landfill been investigated
no			BRICK	agricultural Runoff	

yes(Q)			BRICK	agricultural Runoff	
no			BRICK	agricultural Runoff	
no			BRICK	agricultural Runoff	
Yes(P)			CLYDAGH (FEALE)		
Yes			CLYDAGH (FEALE)		
yes(P)			CLYDAGH (FEALE)	agricultural runoff	
Yes(P)			CLOGHANE(OWENMORE)		
yes			FEALE	agricultural runoff	
Yes			FEALE		
Yes			FEALE		
Yes(P)			FEALE		
yes			FEALE	agricultural runoff/urban run off	impact from Abbeyfeale WWTP, Agricultural run off
Yes			FEALE		
Yes			FEALE		
Yes(P)			FEALE		
yes			FEALE		
yes(P)			FEALE	agricultural runoff	intensive farming + IPC industry
Yes(Q)			FEALE		
yes(Q)			FEALE		
Yes(Q)			FEALE		
Yes			FEALE		
Yes(P)			FEOHANAGH	agricultural runoff	
Yes(P)			FEOHANAGH		
yes			FINGLAS	septic tanks/sewage	
yes(Q)			GALEY	agricultural runoff	farms in Co limerick
No			GALEY	agricultural runoff	farms in Moyvane area
No			GALEY	agricultural runoff	
yes(Q)			GALEY	agricultural runoff	
No			GALEY	agricultural runoff	
yes(P)			GLASHACOONCORE	afforestatior	
Yes(P)			GLASHACOONCORE	afforestatior	
yes(P)			GLASHOREAG	afforestatior	
Yes(P)			GLENNAHOO	agricultural runoff	currently been investigated
yes(Q)			LEE (TRALEE)	Farmyard discharge	one farm just u/s of this point been currently investigated
no			LEE (TRALEE)	Farmyard discharge	one farm just u/s of this point been currently investigated
yes(Q)			LEE (TRALEE)	agricultural runoff	

no			LEE (TRALEE)	urban stormwater overflows	Tralee urban area
Yes			LYRACRUMPANE		
Yes			MILLTOWN HOUSE STREAM	agricultural runoff	
yes(P)			OWENCASHLA	afforestation	a lot of new afforestation schemes u/s of this point
Yes(P)			OWENMORE (KERRY)		
Yes			OWENMORE (KERRY)		
Yes(P)			OWENNAFEANA		
Yes			OWVEG (KERRY)		
Yes			OWVEG (KERRY)		
Yes			OWVEG (KERRY)		
Yes			SCORID		
Yes			SMEARLAGH	agricultural runoff	
Yes			SMEARLAGH		
Yes			SMEARLAGH		
Yes			SMEARLAGH		
Yes			SMEARLAGH		
yes(P)			TULLALEAGUE	agricultural runoff	piggery u/s of this point
no			TYSHE	agricultural runoff/farmyard discharge	
no			TYSHE	agricultural runoff	
no			TYSHE	agricultural runoff/small scale sewage treatment plant	ardfert STP
no			TARMON STREAM	agricultural runoff	
Yes			BALLYLONGFORD		
no			BALLYLONGFORD	Agricultural Runoff/Farmyard discharges	Farm surveys been conducted in area
yes(Q)			BALLYLONGFORD	Agricultural Runoff+ Farmyard discharges	Farm surveys been conducted in area
no			TARBERT	agricultural runoff	

TABLE 2.1 IMPLEMENTATION PROGRAMME SUMMARY TABLE FOR LOCAL AUTHORITY AREA

Local Authority Name	Kerry	Reporting Year	2006						
Standard	**Measures**	**Targets**	**Actions**	**Timeframe**	**Responsible for Implementation**	**Progress to Date**	**Corrective Actions**	**Action Completed Within Timeframe Yes/No**	**If No, State Revised Timeframe**
To improve unsatisfactory water quality and to maintain satisfactory water quality in County Kerry : Examine all Point Sources.	Review and enforcement of existing section 4 licences in light of the requirements of the Phosphorous Regulations.	Reduce phosphorous inputs from licenced premises.	Determine phosphorous loads from licenced premises, assimilative capacity of receiving waters and whether changes are required to the licence.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	All significant licences reviewed. Review process on-going for remaining licences.		No	31/12/2007
			Set-up regular monitoring/sampling procedures, site inspections and audits of discharges.	31/07/2002	Senior Executive Engineer, Senior Executive Chemist - Environment Protection Section.	Monitoring/sampling programme in place and operating for all licences. Site inspections and audits of discharges are carried out as required.		Yes	
			Prosecution for non-compliance with licences.	On-going	Senior Executive Engineer - Environment Protection Section.				
	Review and enforcement of existing section 16 licences in light of the requirements of the Phosphorous Regulations.	Reduce phosphorous inputs from licenced premises.	Determine phosphorous loads from licenced premises, assimilative capacity of receiving waters and whether changes are required to the licence.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	All significant licences reviewed. Review process on-going for remaining licences.		No	31/12/2007
			Set-up regular monitoring/sampling procedures, site inspections and audits of discharges.	31/07/2002	Senior Executive Engineer, Senior Executive Chemist - Environment Protection Section.	Monitoring/sampling programme in place and operating for all significant licences. Site inspections and audits of discharges are carried out as required.		Yes	
			Prosecution for non-compliance with licences.	On-going	Senior Executive Engineer - Environmental Services Department.				
	Wastewater Treatment Plants	Reduce phosphorous inputs from wastewater treatment plants.	Establish which wastewater treatment plants are discharging to rivers listed in table 2.1.	31/07/2002	Senior Executive Engineer, Senior Exective Chemist - Environment Protection Section.	Completed.		Yes	
			Monitor discharges and establish phosphorous loads from wastewater treatment plants.	31/07/2002	Senior Executive Engineer, Senior Exective Chemist - Environment Protection Section.	Comprehensive monitoring programme in place.		Yes	
			Establish a priority list and cost of up-grading wastewater treatment plants.	31/07/2002	Senior Engineer, Senior Executive Engineer - Water Services Departments.	Completed.		Yes	

Standard	Measures	Targets	Actions	Timeframe	Responsible for Implementation	Progress to Date	Corrective Actions	Action Completed Within Timeframe Yes/No	If No, State Revised Timeframe
			Seek funding and carry out works.	31/07/2002	County Manager, Director of Service (Environment), Senior Engineer (Water Services Departments), DoELG.	This is an on-going process involving discussions with relevant Government Departments.			On-going
To improve unsatisfactory water quality and to maintain satisfactory water quality in County Kerry : Examine all Non-Point Sources.	Enforcement of section 3 of the Act.	Reduce phosphorous inputs to watercourses.	Review existing water quality for all catchments and investigate areas where high P is found.	31/07/2002	Senior Executive Engineer, Senior Executive Chemist - Environment Protection Section.	Review of water quality has been completed - detailed investigations of areas with high P is on-going. Small Streams Risk Assessment (biological) of vulnerable catchments also in progress.		No	31/12/2007
			Issue and enforcement of section 12 notices.	On-going	Senior Executive Engineer - Environment Protection Section.	Total number of Section 12 notices issued since submission of previous implementation report : 142		On-going	
	Regulation and control of certain agricultural activities under section 21 of the Act.	Reduce phosphorous inputs to watercourses.	Examine the requirement for the making of Bye-Laws under the Act with regard to prohibiting or regulating specified activities in the the whole or part of the Local Authority's functional area.	31/07/2002	County Manager, Director of Service (Environment), Senior Engineer/Senior Executive Engineer (Environment Protection Section).	Draft Bye-Laws prepared for the Lough Leane Catchment. Adoption process has not been completed on account of recent introduction of Nitrates Regulations. Unlikely that L.Leane Bye-Laws will now be introduced in light of this, however, consideration still being given to L.Guitane Bye-Laws.		No	Uncertain
	Farm surveys	Assess farm management requirements on farms to reduce phosporous inputs to watercourses.	Review existing water quality for feeder streams in agricultural areas.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	Reviews have been completed in the following river catchments since submission of the previous Implementation Report : Feale, Flesk (Lower Catchment), Shanowen, Glashoreag.		No	31/12/2007
			Designate areas where farm surveys are required.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	Designation of catchments completed.		Yes	

Standard	Measures	Targets	Actions	Timeframe	Responsible for Implementation	Progress to Date	Corrective Actions	Action Completed Within Timeframe Yes/No	If No, State Revised Timeframe
		Increase awareness of pollution of watercourses amongst the farming community.	While carrying out farm surveys, create awareness of pollution of watercourses due to farming activities, encourage farmers to part-take in REPS, Control of Farm Pollution Schemes etc.	On-going	Senior Executive Engineer - Environment Protection Section.	Farm surveys completed to date in following river catchments : Ballylongford, Brick, Emlaghmore, Galey, Lee (tralee), Milltown House Stream, Tarmon Stream, Tarbert, Tyshe, Feale, Flesk (Lower Catchment, Shanowen, Glashoreag.			
	Assess nutrient management planning under section 21A of the Act for non-point sources within the County.	Assess need for the application of nutrient management planning in specific catchments.	Review existing water quality data.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	Completed.		Yes	
			Review feeder streams where high P is found.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	On-going.			31/12/2007
			Designate areas where nutrient management planning is required.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	On-going.			31/12/2007
	Establish Multi-Sectoral Catchment Management Group.	Co-operative approach across all sectors that contribute to phosphorous losses in the catchment.	Gather all relevant information on all issues that affect the quality of water in the county. Gather all this information on GIS and assess the combined impact of all these facts.	31/07/2001	Senior Executive Engineer - Environment Protection Section.	All relevant information gathered, GIS system will be established in line with EPA requirements/recommendations for River Basin District Monitoring and Management Systems.	Install appropriate Catchment Monitoring and Management GIS system.	No.	31/12/2007
			Present the above findings to this group. Discuss all the issues and formulate measures to tackle the issues.		Senior Executive Engineer - Environment Protection Section.	Kerry County Council is in regular contact with a range of sectoral groups and state organisation involved in the area of water quality management through both the L.Leane Working Group and the River Basin District committees.		On-going	
			Implement the above measures.	31/07/2003	Senior Executive Engineer - Environment Protection Section.	on-going		On-going	
	Publicity and public awareness campaign.	Create awareness of water quality issues, provide information on means of reducing pollution occurring, provide assistance and advice to interested organisations.	Establish schools education programme. Promotion of project awareness.	On-going	Senior Executive Engineer - Environment Protection Section.			On-going	
Monitoring programme of the rivers and lakes in the county.	Integration of local authority monitoring activities with EPA river and lake monitoring activities to avoid unnecessary duplication of effort.		Integrate local authority and EPA monitoring programme.	ongoing	Senior Executive Chemist - Environment Protection Section.	On-going. Integration of P-Regs and Salmonid Regs monitoring with revised RBD Monitoring Networks also at an advances stage			

Standard	Measures	Targets	Actions	Timeframe	Responsible for Implementation	Progress to Date	Corrective Actions	Action Completed Within Timeframe Yes/No	If No, State Revised Timeframe
	Implement proposed monitoring programme for the county.		Set-up and implement testing programme.	ongoing	Senior Executive Chemist - Environment Protection Section.	unable to monitor all stations for mrp during reporting period due to lack of resources	1)Integrate P monitoring as part of operational monitoring programme for the RBDs; 2) Seek more funding for laboratory resources as part of RBD programme; 3)Ensure that instrumentation in the laboratory is up-graded as part of the RBD modernisation process; 4) Endeavour to repeat monitoring of all river stations; 5) Provide monitoring backup for farm survey work.	No	31/12/2007
	Identify catchments/sub-catchments with specific problems.		Draw up particular measures to address these specific catchment problems.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	A programme of measures has been drawn up and is being implemented for a range of river and lake catchments in the county.		Yes	
	Review the overall implementation programme in light of the findings of the Lough Leane Catchment Project and other catchment projects		Study project's findings and implement appropriate measures.	31/07/2002	Senior Executive Engineer - Environment Protection Section.	Completed.		Yes.	

TABLE 2.2 IMPLEMENTATION PROGRAMME SUMMARY TABLE FOR RIVERS IN LOCAL AUTHORITY AREA											
Local Authority Name	**Kerry County Council**	**Reporting Year**	**2006**								
River	**Reach of River**	**Standard**	**Measures**	**Targets**	**Actions**	**Timeframe**	**Responsible for Implementation**	**Progress to Date**	**Corrective Actions**	**Action Completed Within Timeframe Yes/No**	**If No, State Revised Timeframe**
Ballylongford	Entire river.	To improve and maintain water quality at various stations on Ballylongford River.	Refer to report for 2000-2002	Various : refer to report for 2000-2002	Various : refer to report for 2000-2002	31/07/2002	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	
Brick	Entire river.	To improve and maintain water quality at various stations on River Brick.	Refer to report for 2002-2004	Various : refer to report for 2002-2004	Various : refer to report for 2002-2004	31/07/2004	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	
Emlaghmore	Entire river.	To improve and maintain water quality at various stations on River Brick.	Refer to report for 2002-2004	Various : refer to report for 2002-2004	Various : refer to report for 2002-2004	31/07/2004	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	
Feale	Entire river.	To improve and maintain water quality at various stations on the River Feale.	Farm surveys	Assess farm management requirement on farms to reduce P inputs to river.	Review water quality data to determine where farm surveys are required.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Water quality data reviewed and areas identified for farm surveys.		Yes.	
					Carry out farm surveys in catchment hot-spots.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Farm surveys carried out in catchment hot-spots. Total no. farms surveyed : 174		Yes.	
			Enforce Water Pollution Act.	Reduce P inputs to river.	Issue and enforce section 3, 10, 12 and 13 notices.	31/07/2006	Senior Executive Engineer - Environment Protection Section			Yes.	
					Issue and enforce section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	No licence requirements identified.		Yes.	
					Review section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	N/A		Yes.	
			Promote REPS and Farm Pollution Scheme.	Improve farm management.	Promotion/Education.	On-going	Senior Executive Engineer - Environment Protection Section	Improved farm management promotion carried out as part of farm survey process.			
Fleask (Lower Catchment)	Lower Catchment	To improve and maintain water quality at various stations on the River Flesk.	Farm surveys	Assess farm management requirement on farms to reduce P inputs to river.	Review water quality data to determine where farm surveys are required.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Water quality data reviewed and areas identified for farm surveys.		Yes.	
					Carry out farm surveys in catchment hot-spots.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Farm surveys carried out in catchment hot-spots. Total no. farms surveyed : 30		Yes.	
			Enforce Water Pollution Act.	Reduce P inputs to river.	Issue and enforce section 3, 10, 12 and 13 notices.	31/07/2006	Senior Executive Engineer - Environment Protection Section			Yes.	
					Issue and enforce section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	No licence requirements identified.		Yes.	
					Review section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	N/A		Yes.	
			Promote REPS and Farm Pollution Scheme.	Improve farm management.	Promotion/Education.	On-going	Senior Executive Engineer - Environment Protection Section	Improved farm management promotion carried out as part of farm survey process.			

River	Reach of River	Standard	Measures	Targets	Actions	Timeframe	Responsible for Implementation	Progress to Date	Corrective Actions	Action Completed Within Timeframe Yes/No	If No, State Revised Timeframe
Glashoreag	Entire river.	To improve and maintain water quality at various stations on the Glashoreag River.	Farm surveys	Assess farm management requirement on farms to reduce P inputs to river.	Review water quality data to determine where farm surveys are required.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Water quality data reviewed and areas identified for farm surveys.		Yes.	
					Carry out farm surveys in catchment hot-spots.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Farm surveys carried out in catchment hot-spots. Total no. farms surveyed : 5		Yes.	
			Enforce Water Pollution Act.	Reduce P inputs to river.	Issue and enforce section 3, 10, 12 and 13 notices.	31/07/2006	Senior Executive Engineer - Environment Protection Section			Yes.	
					Issue and enforce section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	No licence requirements identified.		Yes.	
					Review section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	N/A		Yes.	
			Promote REPS and Farm Pollution Scheme.	Improve farm management.	Promotion/Education.	On-going	Senior Executive Engineer - Environment Protection Section	Improved farm management promotion carried out as part of farm survey process.			
Galey	Entire river.	To improve and maintain water quality at various stations on River Brick.	Refer to report for 2002-2004	Various : refer to report for 2002-2004	Various : refer to report for 2002-2004	31/07/2004	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	
Lee (Tralee)	Entire river.	To improve and maintain water quality at various stations on River Brick.	Refer to report for 2002-2004	Various : refer to report for 2002-2004	Various : refer to report for 2002-2004	31/07/2004	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	
Milltown House Stream	Entire river.	To improve and maintain water quality at various stations on River Brick.	Refer to report for 2002-2004	Various : refer to report for 2002-2004	Various : refer to report for 2002-2004	31/07/2004	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	
Tarbert	Entire river.	To improve and maintain water quality at various stations on Tarbert River.	Refer to report for 2000-2002	Various : refer to report for 2000-2002	Various : refer to report for 2000-2002	31/07/2002	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	
Shanowen	Entire river.	To improve and maintain water quality at various stations on the Shanowen River.	Farm surveys	Assess farm management requirement on farms to reduce P inputs to river.	Review water quality data to determine where farm surveys are required.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Water quality data reviewed and areas identified for farm surveys.		Yes.	
					Carry out farm surveys in catchment hot-spots.	31/07/2006	Senior Executive Engineer - Environment Protection Section	Farm surveys carried out in catchment hot-spots. Total no. farms surveyed : 20		Yes.	
			Enforce Water Pollution Act.	Reduce P inputs to river.	Issue and enforce section 3, 10, 12 and 13 notices.	31/07/2006	Senior Executive Engineer - Environment Protection Section			Yes.	
					Issue and enforce section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	No licence requirements identified.		Yes.	
					Review section 4 and 16 licences.	31/07/2006	Senior Executive Engineer - Environment Protection Section	N/A		Yes.	
			Promote REPS and Farm Pollution Scheme.	Improve farm management.	Promotion/Education.	On-going	Senior Executive Engineer - Environment Protection Section	Improved farm management promotion carried out as part of farm survey process.			
Tarmon Stream (tributary of Galey)	Entire river.	To improve and maintain water quality at various stations on River Brick.	Refer to report for 2002-2004	Various : refer to report for 2002-2004	Various : refer to report for 2002-2004	31/07/2004	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	

River	Reach of River	Standard	Measures	Targets	Actions	Timeframe	Responsible for Implementation	Progress to Date	Corrective Actions	Action Completed Within Timeframe Yes/No	If No, State Revised Timeframe
Tyshe	Entire river.	To improve and maintain water quality at various stations on River Tyshe.	Refer to report for 2000-2002	Various : refer to report for 2000-2002	Various : refer to report for 2000-2002	31/07/2002	Senior Executive Engineer - Environment Protection Section	Actions Completed		Yes.	

G.3 Impact Mitigation

Provide details on a programme of improvements to ensure that discharges from the agglomeration will not result in significant environmental pollution.

Attachment G.3 should contain the most recent programme of improvements, including a copy of any approved funding for the project and a timeframe for the completion of the necessary works to take place.

Attachment included	**Yes**	**No**
	√	

Attachment G.3 Impact Mitigation

Discharge Standards

The primary objective in setting an effluent quality standard for Ballylongford is to ensure that the effluent quality complies with all current statutory regulations applying to effluent discharges as well as complying with best engineering and environmental practice. The relevant regulatory guidelines in this case are found in the following documents:

- Urban Wastewater Treatment Regulations, 2001 (S.I. No. 254 of 2001).
  Revoking the EPA Act 1992, giving further effect to the Council Directive
  91/271/EEC as amended by Council Directive 98/15/EC.
- Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998. S.I. No. 258 of 1998.
- European Communities (Quality of Salmonid Waters) Regulations, S.I.
  293/88.
- Shannon Estuary Water Quality Management Plan (WQMP).

Urban Wastewater Treatment Regulations

The minimum treatment standards required at the WwTPs as set down in the Urban Wastewater Treatment Regulations (UWTR) are as follows:

"A Sanitary Authority should ensure by the 31st December 2005 that urban wastewater entering a collection system shall before discharge be subject to appropriate treatment in respect of discharges to freshwater from agglomerations with a population equivalent of less than 2,000".
"A Sanitary Authority should ensure by the 31st December 2005 that urban wastewater entering a collection system shall before discharge be subject to appropriate treatment in respect of discharges to coastal waters from agglomerations with a population equivalent of less than 10,000".

Where "appropriate treatment" is defined as "treatment of urban waste water by any process and or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and the relevant provisions of the directive and of other community directives".

As the population of Ballylongford is less than 2,000 p.e. and is likely to remain so, wastewater collected at Ballylongford should be subject to "appropriate treatment".
The receiving water at Ballylongford is an estuary, and therefore a mix of fresh and sea water, however, for the purposes of this report, the receiving will be assumed to a fresh water, which is a conservative approach and particularly appropriate given the environmental designations of the area.

Phosphorus Regulations

The Phosphorus loads permitted in a river are governed by the Phosphorus Regulations (S.I. 258 of 1998). The salient features of these regulations are summarised below:

a) The standards quoted are in terms of Molybdate – Reactive Phosphate.
b) The concentrations measured are median values determined using a minimum of 10 samples taken at intervals of four weeks or longer in any 12 consecutive month period.
c) The existing biological quality rating / Q index is to be improved to meet the minimum target biological quality rating / Q index as detailed in the Regulations.

The Phosphorus Regulations however only apply to freshwaters such as rivers and lake and do not apply to estuarine waters. However, for the sake of completeness, the assimilative capacity in relation to Phosphorus will be examined.

Shannon Estuary Water Quality Management Plan

The principal beneficial uses identified in the WQMP which require water of a certain quality are:

Fisheries
Recreation and Amenity
Fauna

Where a variety of beneficial uses must be catered for, those uses requiring the highest quality of water determine the criteria and standards which must be set. Salmonid fish are particularly sensitive to water quality and adequate water quality to allow passage of these fish is considered to be the most significant threshold.

As many of the smaller tributaries of the Shannon Estuary support salmon fish stocks, the WQMP proposes that water quality parameters necessary for the passage of these species should apply over the full extent of the Shannon Estuary.

Discharge Specification

BOD
Due to the relatively low waste assimilative capacity of the stream, an effluent BOD standard of 15.0 mg/l would be required of discharging directly to the stream, however, it is proposed to discharge through the existing outfall, at high tide only, so that the dilutions available would allow many multiples of this figure. As such, a standard of 25mg/l is proposed.

Phosphorus
An effluent standard of 1.0 mg/l would be required for MRP as a result of the low waste assimilative capacity of the Ballyline River, however, given the proposed discharge method, and the fact that the receiving water is estuarine, no Phosphorus standard is proposed.

Total Ammonia
An effluent standard of 5.0 mg/l would be required for ammonia as a result of the low waste assimilative capacity of the river, however, given the proposed discharge method, and the fact that the receiving water is estuarine, no Ammonia

standard is proposed.

As the discharge location is to an estuary, significant dilutions will be available as the tide rises. Therefore the use of a tidal tank to control the discharge will negate the need for the tertiary standard and/or nutrient limits thus compliance with the UWWTR only is proposed.

Table 1– Discharge Specification

Parameter	Discharge Specification * (mg/l)
BOD Suspended Solids COD	25 mg/l 35 mg/l 125 mg/l

*** Note Nutrient limits are not proposed.**

G.4 Storm Water Overflow

Provide details on a programme of improvements to ensure that discharges other than the primary and secondary discharges comply with the definition of 'storm water overflow' as per Regulation 3 of the Waste Water Discharge (Authorisation) Regulations, 2007.

Attachment G.4 should contain the most recent programme of improvements, including a copy of any approved funding for the project and a timeframe for the completion of the necessary works to take place.

Attachment included	**Yes**	**No**
	√	

Attachment G.4 Storm Water Overflow

Recommended Storm Water Management Policy

Traditionally, surface water runoff from new developments would be discharged to the nearest available receiving water. However, this has had the following detrimental effects:

- The catchment response is accelerated as the time of flow from a directly connected development is vastly shorter than a green-field site. This shortens the time to peak flow in a catchment
- The groundwater recharge is lowered.
- Storm water discharge directly to receiving waters from separate storm water drainage pipe networks has been found to have substantial pollution potential associated with high levels of suspended solids and organic matter washed off during rainfall, together with misdirected foul connections. As a result, the water quality of rural receiving waters can become degraded from draining the storm water of new development areas.

The detrimental effects of traditional storm water drainage, listed above, are inconsistent with the principles of sustainable development. In order to combat these adverse effects of traditional drainage design, recent national and international practice has been to:

- Limit the forward flow from newly developed areas to a pre-determined green-field value and to safely store the excess flow until such time as it can be cleared. This can help alleviate the risk of flooding by maintaining the existing catchment rainfall – runoff response.
- Incorporate Sustainable Drainage Systems (SuDS) based on Best Management Practices (BMPs), which can slow down the runoff of rainfall to receiving waters and allow infiltration of run-off to the soil. This can protect natural groundwater recharge; hence improve through filtration the quality of storm water.

Increased development in the town will involve the covering of green-field areas with impermeable material and could result in an increase in the proportion of rainwater contributing to immediate surface runoff. In the case of a significant development this could be an issue.

Despite this, it is recommended that a sustainable drainage policy be developed and enforced by Kerry County Council for all new developments withinBallylongford. Each development will need to be assessed individually for an acceptable storm water runoff rate and, where possible, SuDS technology should be incorporated into the drainage layout for the site. Individual dwelling should incorporate soak pits for rainwater, primarily as a method of preventing infiltration into the existing foul sewer system

Table 2.7 below indicates the typical Permissible Outflow Rates for developments
of different sizes. These outflow rates are calculated using a SOIL index value of

0.45 and a SAAR (Standard Annual Average Rainfall) value of 1,200 mm. These catchments characteristics were obtained from the Flood Studies Report, 1975.

Table 1 – Permissible Outflow Rate

Soil Class	**4**	
Soil Index	**0.45**	
Development Area (ha)	**Permissible Outflow Rate**	
	l/s	**l/s/ha**
0.5	6.85	13.70
1	12.69	12.69
2	23.52	11.76
3	33.74	11.25
4	43.59	10.90
5	53.16	10.63
6	62.53	10.42
7	71.73	10.25
8	80.78	10.10
9	89.70	9.97
10	98.52	9.85

Further reference should be made to:

Storm Water Management Policy for Developers, Dublin City Council, (1998).
Flood Studies Report, National Environment Research Council, (1975).
CIRIA No. 521 - SuDS Design Manual.
Greater Dublin Strategic Drainage Study – Environmental Policy.

SECTION H: DECLARATION

Declaration

I hereby make application for a waste water discharge licence/revised licence, pursuant to the provisions of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007).

I certify that the information given in this application is truthful, accurate and complete.

I give consent to the EPA to copy this application for its own use and to make it available for inspection and copying by the public, both in the form of paper files available for inspection at EPA and local authority offices, and via the EPA's website.

This consent relates to this application itself and to any further information or submission, whether provided by me as Applicant, any person acting on the Applicant's behalf, or any other person.

Signed by : Brian Sweeney **Date :** 19/6/2009
(on behalf of the organisation)

Print signature name: BRIAN SWEENEY

Position in organisation: SENIOR ENGINEER

SECTION I: JOINT DECLARATION

Joint Declaration [Note1]

I hereby make application for a waste water discharge licence/revised licence, pursuant to the provisions of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007).

I certify that the information given in this application is truthful, accurate and complete.

I give consent to the EPA to copy this application for its own use and to make it available for inspection and copying by the public, both in the form of paper files available for inspection at EPA and local authority offices, and via the EPA's website.

This consent relates to this application itself and to any further information or submission whether provided by me as Applicant, any person acting on the Applicant's behalf, or any other person.

Lead Authority

Signed by :_____ **Date :**_____
(on behalf of the organisation)

Print signature name: _____

Position in organisation:_____

Co-Applicants

Signed by :_____ **Date :**_____
(on behalf of the organisation)

Print signature name: _____

Position in organisation:_____

Signed by :_____ **Date :**_____
(on behalf of the organisation)

Print signature name: _____

Position in organisation:_____

Note 1: In the case of an application being lodged on behalf of more than a single water services authority the following declaration must be signed by all applicants.