SECTION E: MONITORING

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

E.1 Waste Water Discharge Frequency and Quantities – Existing & Proposed

Provide an estimation of the quantity of waste water likely to be emitted in relation to all primary and secondary discharge points applied for. This information should be included in Table E.1(i) via the following web based link: http://78.137.160.73/epa_wwd_licensing/.

Provide an estimation of the quantity of waste water likely to be emitted in relation to all storm water overflows within the agglomeration applied for. This information should be included in Table E.1(ii) via the following web based link: http://78.137.160.73/epa_wwd_licensing/.

Indicate if composite sampling or continuous flow monitoring is in place on the primary or any other discharge points. Detail any plans and timescales for the provision of composite sampling and continuous flow meters.

Attachment E.1 Waste Water Discharge Frequency and Quantities – Existing & Proposed

E.2. Monitoring and Sampling Points

Programmes for environmental monitoring should be submitted as part of the application. These programmes should be provided as Attachment E.2.

Reference should be made to, provision of sampling points and safe means of access, sampling methods, analytical and quality control procedures, including equipment calibration, equipment maintenance and data recording/reporting procedures to be carried out in order to ensure accurate and reliable monitoring.

In determining the sampling programme to be carried out, the variability of the emission and its effect on the receiving environment should be considered.

Details of any accreditation or certification of analysis should be included. **Attachment E.2** should contain any supporting information.

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

Attachment E.2. Monitoring and Sampling Points

E.3. Tabular data on Monitoring and Sampling Points

Applicants should submit the following information for each monitoring and sampling point:

PT_CD	PT_TYPE	MON_TYPE	EASTING	NORTHING	VERIFIED
Point Code Provide label ID's assigned in section E of application	Point Type (e.g., Primary, Secondary, Storm Water Overflow)	Monitoring Type M = Monitoring S = Sampling	6E-digit GPS Irish National Grid Reference	6N-digit GPS Irish National Grid Reference	Y = GPS used N = GPS not used

An individual record (i.e., row) is required for each monitoring and sampling point. Acceptable file formats include Excel, Access or other upon agreement with the Agency. A standard Excel template can be downloaded from the EPA website at www.epa.ie. http:///This data should be submitted to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, B.5, C.1, D.2 and F.2.

Attachment E.3. Tabular data on Monitoring and Sampling Points

E.4 Sampling Data

Regulation 16(1)(h) of the Waste Water Discharge (Authorisation) Regulations 2007 requires all applicants in the case of an existing waste water treatment plant to specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application.

Regulation 16(1)(l) of the regulations requires applicants to give details of compliance with any applicable monitoring requirements and treatment standards.

Attachment E.4 should contain any supporting information.

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

Attachment E.4 Sampling Data

Ballyduff Waste Water Treatment Plant

Date	Influent Suspended Solids (mg/l)	Influent B.O.D. (mg/l)	Influent C.O.D. (mg/l)	Effluent Suspended Solids (mg/l)	Effluent B.O.D. (mg/l)	Effluent C.O.D. (mg/l)
23-Sep-08	433	292	887	141	283	O/R*
22-Dec-08	264	192	608	53	477	O/R*
31-Mar-09	369	218	670	161	211	371

* Over range for test procedure. Analysis result greater than165 mg/l C.O.D.

Please Note that all samples were grab samples - there is no composite sampler on site.
No flows are available as there is no flow meter on site.

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SECTION F: EXISTING ENVIRONMENT & IMPACT OF THE DISCHARGE(S)

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

Detailed information is required to enable the Agency to assess the existing receiving environment. This section requires the provision of information on the ambient environmental conditions within the receiving water(s) upstream and downstream of any discharge(s).

Where development is proposed to be carried out, being development which is of a class for the time being specified under Article 24 (First Schedule) of the Environmental Impact Assessment Regulations, the information on the state of the existing environment should be addressed in the EIS. **In such cases, it will suffice for the purposes of this section to provide adequate cross-references to the relevant sections in the EIS.**

F.1. Assessment of Impact on Receiving Surface or Ground Water

- Give summary details and an assessment of the impacts of any existing or proposed emissions on the environment, including environmental media other than those into which the emissions are to be made.

- Details of all monitoring of the receiving water should be supplied via the following web based link: http://78.137.160.73/epa_wwd_licensing/. Tables F.1(i)(a) & (b) should be completed for the primary discharge point. Surface water monitoring locations upstream and downstream of the discharge point shall be screened for those substances listed in Tables F.1(i)(a) & (b). Monitoring of surface water shall be carried out at not less than two points, one upstream from the discharge location and one downstream.

- For discharges from secondary discharge points Tables F.1(ii)(a) & (b) should be completed. Furthermore, provide summary details and an assessment of the impacts of any existing or proposed emissions on the surface water or ground (aquifers, soils, sub-soils and rock environment), including any impact on environmental media other than those into which the emissions are to be made.

- Provide details of the extent and type of ground emissions at the works. For larger discharges to groundwaters, e.g., from Integrated Constructed Wetlands, large scale percolation areas, etc., a comprehensive report must be completed which should include, inter alia, topography, meteorological data, water quality, geology, hydrology, and hydrogeology. The latter must in particular present the aquifer classification and vulnerability. The Geological Survey of Ireland Groundwater Protection Scheme Dept of the Environment and Local Government, Geological Survey of Ireland, EPA (1999) methodology should be used for any such classification. This report should also identify all surface water bodies and water wells that may be at risk as a result of the ground discharge.

- Describe the existing environment in terms of water quality with particular reference to environmental quality standards or other legislative standards. Submit a copy of the most recent water quality management plan or catchment management plan in place for the receiving water body. Give details of any designation under any Council Directive or Regulations that apply in relation to the receiving water.

- Provide a statement as to whether or not emissions of main polluting substances (as defined in the *Dangerous Substances Regulations S.I. No. 12 of 2001*) to water are likely to impair the environment.

- In circumstances where water abstraction points exist downstream of any discharge describe measures to be undertaken to ensure that discharges from the waste water works will not have a significant effect on faecal coliform, salmonella and protozoan pathogen numbers, e.g., Cryptosporidium and Giardia, in the receiving water environment.

- Indicate whether or not emissions from the agglomeration or any plant, methods, processes, operating procedures or other factors which affect such emissions are likely to have a significant effect on –

  (a) a site (until the adoption, in respect of the site, of a decision by the European Commission under Article 21 of Council Directive 92/43/EEC for the purposes of the third paragraph of Article 4(2) of that Directive) —

    (i) notified for the purposes of Regulation 4 of the Natural Habitats Regulations, subject to any amendments made to it by virtue of Regulation 5 of those Regulations,

    (ii) details of which have been transmitted to the Commission in accordance with Regulation 5(4) of the Natural Habitats Regulations, or

    (iii) added by virtue of Regulation 6 of the Natural Habitats Regulations to the list transmitted to the Commission in accordance with Regulation 5(4) of those Regulations,

  (b) a site adopted by the European Commission as a site of Community importance for the purposes of Article 4(2) of Council Directive 92/43/EEC[1] in accordance with the procedures laid down in Article 21 of that Directive,

  (c) a special area of conservation within the meaning of the Natural Habitats Regulations, or

  (d) an area classified pursuant to Article 4(1) or 4(2) of Council Directive 79/409/EEC[2].

  [1]Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ No. L 206, 22.07.1992)

  [2]Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (OJ No. L 103, 25.4.1979)

- Describe, where appropriate, measures for minimising pollution over long distances or in the territory of other states.

- This section should also contain full details of any modelling of discharges from the agglomeration. Full details of the assessment and any other relevant information on the receiving environment should be submitted as **Attachment F.1.**

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

Attachment F.1. Assessment of Impact on Receiving Surface or Ground Water

Assessment of Impact on Receiving Surface or Ground Water.

Watercourses

Ballyduff is situated 2.5 km east of the Cashen River which is an important salmon and sea trout river. The River rises in the mountain district of North Co Cork and flows westerly for 75 km through the county towns of Abbeyfeale and Listowel and enters the sea at Cashen. For the final 10 kms of its course, it is known as the Cashen River. Its main tributaries, flowing from both North and South, combine to in excess of 160 km of river.

Ballyduff is served by an existing combined gravity system. The system drains to an existing wastewater works. The effluent from the plant discharges via outfall to a canal that in turn discharges to the Cashen River to the East.

The Cashen is designated as a Special Area of Conservation (SAC), under the Lower River Shannon SAC (Site Code 002165) as illustrated in Figure 1, and is also classed as a "Sensitive" river under the Urban Wastewater Treatment Regulations (S.I. 254 of 2001).

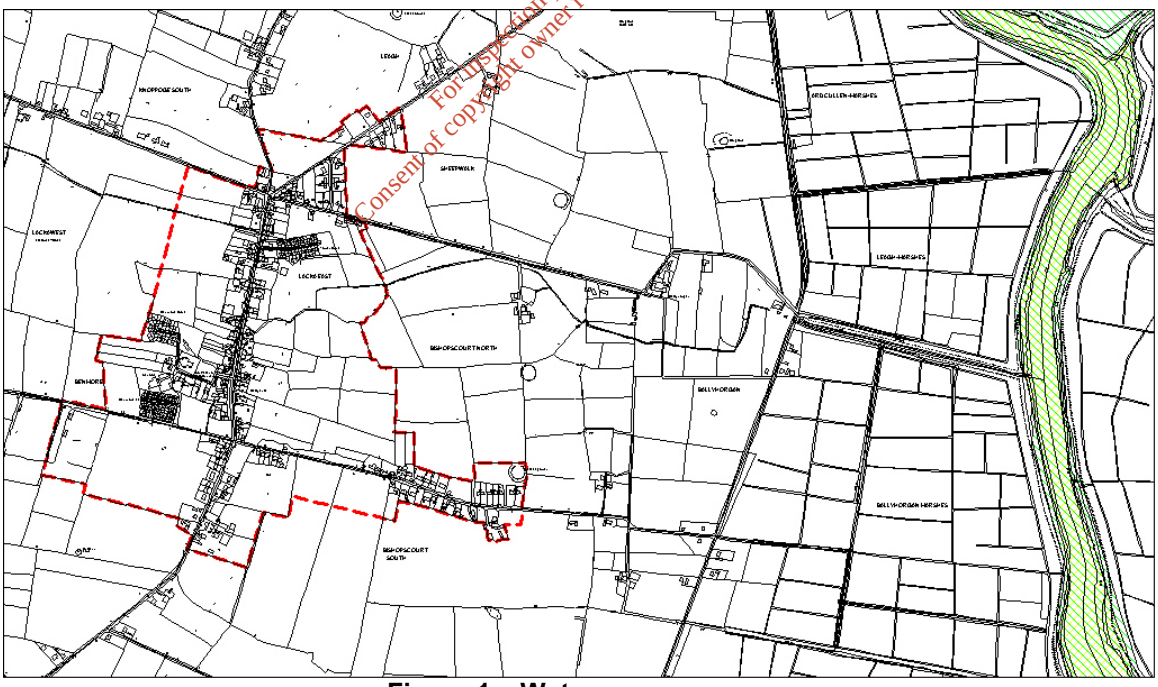


Figure 1 – Water courses

Waste Assimilative Capacity of Receiving Waters

For the purposes of the calculation of the assimilative capacity, the receiving waters have been taken as the Cashen/Feale River on the basis that this is the first aquatic ecosystem that the effluent enters. Prior to entering the river, the

effluent is currently discharged to a land drain, the only purpose of which is to evacuate surplus rainfall runoff.

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.

By concentration mass balance, the allowable effluent concentration is:

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

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 4mg 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.

Total Oxidised Nitrogen

Under the UWWT Regulations (2001), the Cashen Estuary, downstream of Poulnahaha Old Railway to Cashen, has been designated a sensitive area under the Third Schedule of the Regulations. The ultimate population of Ballyduff however is less than 10,000, so as a result no Total Nitrogen (and thus no Total Oxidised Nitrogen) standard applies.

Total Ammonia

The effluent total Ammonia concentration permitted is calculated using the maximum permitted downstream concentration of 1mg/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 0.02mg/l, can harm fish.

Aspects of River Catchment Hydrology

The nearest hydrometric station to Ballyduff is at Listowel (Grid Reference N 997 333) for the Feale River catchment. This station has been in operation since 1946. The reported catchments characteristics at Listowel based on the period of digitised record (1946-2006) and published by the OPW are given below:

Catchment Area	646 km2

95 Percentile Flow	1.41 m3/sec
Average Annual Flow	20.823 m3/sec

The Catchment Area at the WWTP has been estimated to be 750 km2. Extrapolating from the catchment characteristics for the Feale River, the calculated catchment characteristics for the discharge location are given below.

Catchment Area	750 km2
95 Percentile Flow	1.637 m3/sec
Average Annual Flow	24.787 m3/sec

Water Quality

Relevant Biological Water Quality Data for the Feale River is given in the Table 5.4 below. The nearest upstream station is the Railway Bridge upstream of Ferry Bridge (0860) but this station is not rated by the EPA. The station at Finuge Bridge (0800) is however rated by the EPA and is approximately 10km from the proposed discharge point. The closest downstream station from the discharge location is at Ferry Bridge (0900) but this station is currently unrated by the EPA. The sampling locations are illustrated in Figure 1.

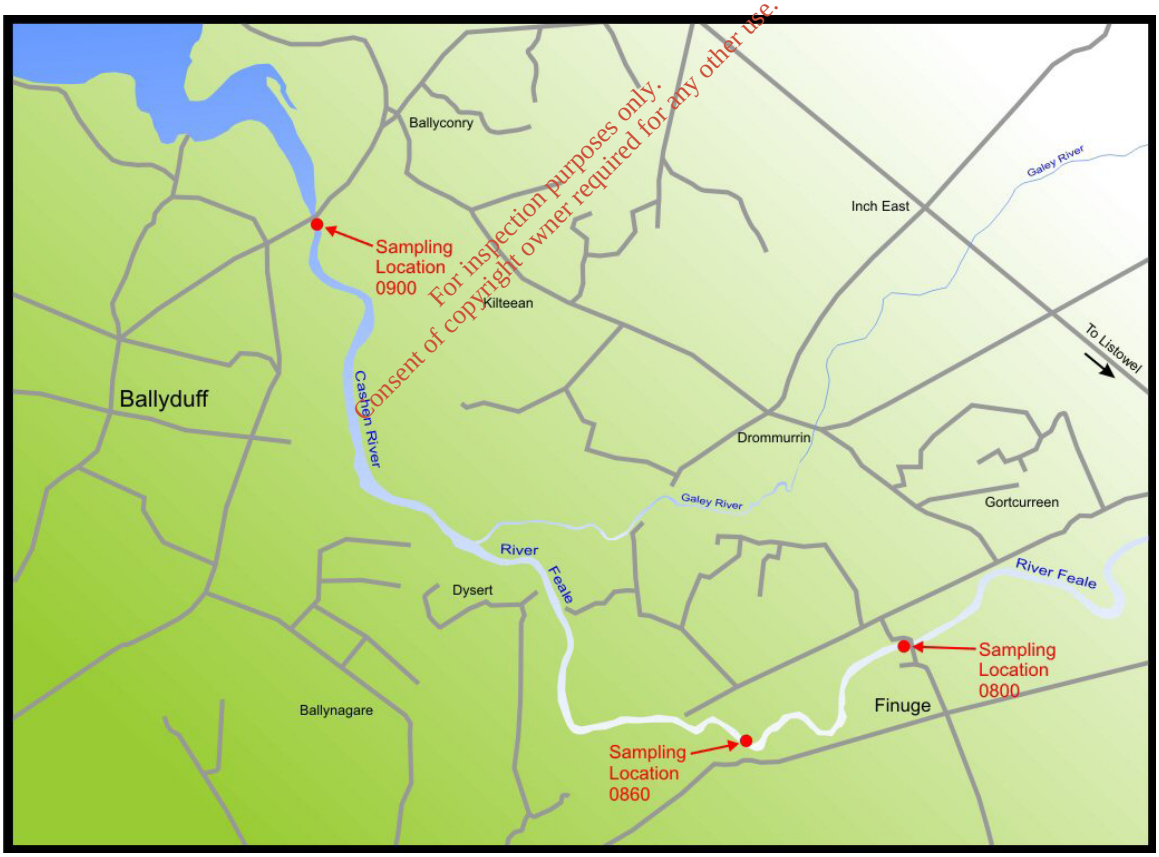


Figure 1 - EPA Sampling locations

Table 1 – Water Quality (Q) Data (EPA) for the Feale River 1971 -2002 (STN0800)

	Biological Quality Rating Q Value									
Year	**1971**	**1975**	**1979**	**1982**	**1984**	**1986**	**1991**	**1996**	**1998**	**2001**
Upstream	4-5	3-4	3	2-3	2-3	2	3	3	3	3-4

Downstream	-	-	-	-	-	-	-	-	-	-

Table 2 – Assumed Upstream Water Quality and actual Chemical Analysis (EPA) 2001 - 2003 for Feale River at Upstream (0860) and Downsteam (0900) Locations

Parameter	Disolved Oxygen (% Saturation)			BOD (mg/l 0_2)		
Station	**Min.**	**Med.**	**Max.**	**Min.**	**Med.**	**Max.**
Upstream	**68**	99	120	1.0	1.8	**7.1**
Downstream	79	95	**132**	1.0	2.0	**8.3**

Parameter	Total Ammonia (mg/l N)			Ortho-Phosphate (mg/l 0_2)		
Station	**Min.**	**Med.**	**Max.**	**Min.**	**Med.**	**Max.**
Upstream	<0.04	0.03	0.22	<0.01	**0.04**	**0.25**
Downstream	<0.02	0.03	**0.32**	<0.01	**0.04**	**0.13**

The Feale river upstream of Ballyduff is currently classified as being moderately polluted. The EPA's assessment of the Feale River was that it was slightly polluted in and downstream of Listowel with a slight improvement recorded at Finuge Bridge.

Waste Assimilative Capacity

BOD
From analysis of the sampling results presented in the table above the upstream value for BOD is taken as 1.8 mg/l. The resultant WAC calc gives an allowable effluent concentration of approx 1,068 mg/l.

Phosphorus
The minimum target ratings and concentrations for these stretches of water as defined in the Phosphorus Regulations are given in the table below:

Phosphorus Regulations Target Ratings and Concentrations

	1996 Biological Quality (Q) Rating/Q Index	Minimum Target Biological Quality (Q) Rating /Q Index	Median Concentration (µg MRP/L)
Upstream	3	3-4	45
Downstream	Unrated	Unrated	Unrated

The upstream water quality must improve to a Q3-4 rating (i.e. 45 µg MRP/l).
The current downstream chemical analysis shows that the water quality at Ferry Bridge for orthophosphate has a value of 40 µg MRP/l. Therefore the allowable increase in the receiving water is taken as 5µg MRP/l.
Using the WAC calculation and Average Flow this gives an allowable effluent standard of 55.00 mg MRP/l.

Total Ammonia
From analysis of the sampling results presented the background value for Total Ammonia is taken as 0.03 mg/l. The resultant WAC calculation gives an effluent concentration of approx 470.4 mg/l.

A summary of the allowable effluent concentrations is shown in Table 3.

Table 3 –Allowable Effluent Concentrations

Parameter	Allowable Effluent Concentrations (mg/l)
BOD	1,068
Phosphorus	55
Ammonia	470

Given the very high allowable effluent concentrations, it is considered that the level of eutrophication in the receiving waters is not affected by the level of nutrient removal in Ballyduff WWTP, and therefore nutrient removal is not necessary.

Nicholas O'Dwyer Ltd carried out an assessment of the assimilative capacity of the receiving waters with respect to the relevant legislation above as part of their 2007 Preliminary Report, based on flow data available from the EPA and recorded water quality data. The assessment determined that the Cashen River has a very large assimilative capacity, with a dilution factor in excess of 600. For example, the maximum allowable BOD discharge concentration to ensure that the downstream concentration is less than the 5mg/l standard required by the Salmonid Waters Regulations is 1,068mg/l. Similarly, the allowable discharge concentrations for phosphorus and ammonia are 55mg/l and 470mg/l respectively.
Based on the assimilative capacity available, the Preliminary Report recommends that a discharge specification of 100mg/l for BOD and 15mg/l for phosphorus be adopted and that three compartmentalised aerated septic tank (CAST) unit be constructed and employed to achieve these standards.
While meeting the requirements of current legislation it is possible that future more restrictive environmental legislation may deem such a discharge standard inappropriate given that the receiving waters are designated as sensitive. Consequently we suggest a further review of this proposal prior to proceeding to construction.
There is no requirement for incorporating specific nutrient removal into the process, given the significant available dilution factor, as confirmed by the assessment of the assimilative capacity.

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 Clashen River is 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 WwTP at Ballyduff.

The treatment process that will ultimately be used in Ballyduff is dependent on the outcome of the strategy and the review of the available procurement options.

However for the purpose of this assessment it is assumed that the works described below will be provided, in line with the 2007 Preliminary Report ,to cater for a population equivalent of 1,370pe:-

- Preliminary and primary treatment using three CAST (Compartmentalised Aerated Septic Tank).
- Degasification chamber.
- Control building.

The Preliminary Report recommends that the treatment plant discharges to the existing canal, which is described in the Report as a land drain, adjacent to the treatment plant site. The report states that the land drain is an artificial channel, not a natural water ecosystem, and therefore not subject to the full environmental concerns applicable to a natural watercourse. The Report recommends that the Council purchase this land and control both access to it and it's upkeep.

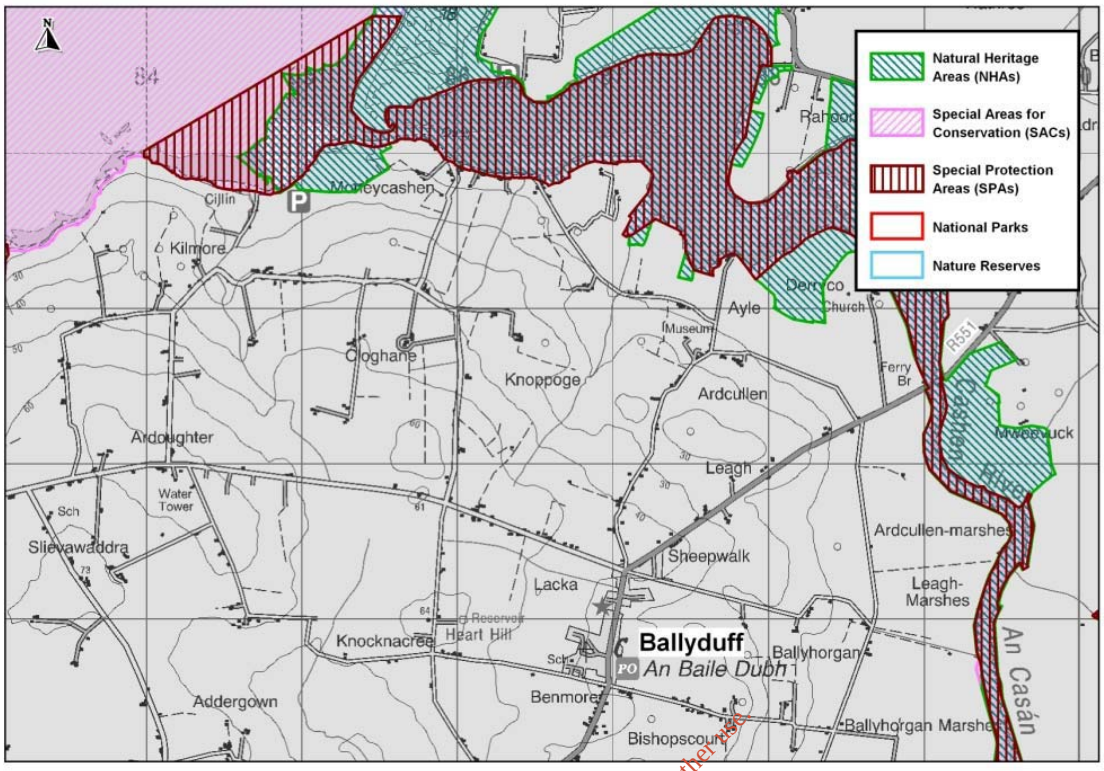
However, we suggest that the canal has ecological, heritage, and amenity value and the
discharge should be made directly to the River Cashen through a 1km outfall pipe from the treatment plant. This outfall pipe has been included in the cost estimates provided in Table 5.4.

Special Protection Area, Special Area of Conservation, and Proposed National Heritage Area

As can be seen from Figure 2 the Clashen River forms part of the following protected areas downstream of the proposed discharge:-

- Cashen River Estuary Special Protection Area (Site Code 004184).
- Lower River Shannon Special Area of Conservation (Site Code 002165).
- Cashen River Estuary proposed National Heritage Area (Site Code 001340).

**Figure 2: Special Protection Area, Special Area of Conservation, and proposed
National Heritage Area near Ballyduff**



The following Site Synopsis Reports are included in this attachment:

002165 Lower River Shannon Special Area of Conservation
004184 Cashen River Estuary Special Protection Area
001340 Cashen River Estuary proposed National Heritage Area,

SITE SYNOPSIS

SITE NAME : LOWER RIVER SHANNON

SITE CODE : 002165

This very large site stretches along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus Estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. The Shannon and Fergus flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian Rocks and the western stretches through Carboniferous Limestone. The Mulkear flows through Lower Palaeozoic Rocks in the upper reaches before passing through Namurian Rocks, followed by Lower Carboniferous Shales and Carboniferous Limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates. Rivers within the subcatchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic Salmon and Otter.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River Estuary.

Both the Fergus and inner Shannon estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some Eel-grass beds (*Zostera* spp.) and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community, which has been noted from the inner Shannon and Fergus estuaries, is a *Macoma-Scrobicularia-Nereis* community.

In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate: swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and Club-rushes (*Scirpus maritimus, S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triquetrus*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*).

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus Estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh Grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Seaspurrey

(*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus Estuary: a type of robust Saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the compass of Common Saltmarsh-grass (*Puccinellia maritima*) and Hard-grass (*Parapholis strigosa*).
Saltmarsh vegetation also occurs around a number of lagoons within the site. The two which have been surveyed as part of a National Inventory of Lagoons are Shannon Airport Lagoon and Cloonconeen Pool. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa, Cerastoderma glaucum, Lekanesphaera hookeri, Palaemonetes varians, Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of Stonewort (*Chara canescens* and *Chara cf. connivens*).
Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris*), Sea Campion (*Silene maritima*), Thrift and Plantains (*Plantago* spp.). A rare endemic Sea Lavender (*Limonium recurvum* subsp. *pseudotranswallinum*) occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Bird's-foot Trefoil (*Lotus corniculatus*).
The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top and below this each of the shores has different characteristic species giving a range of different shore types in the pcSAC.
The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps to ridged bedrock with gullies of sand between the ridges to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.
Other coastal habitats that occur within the site include the following:
- stony beaches and bedrock shores - these shores support a typical zonation of seaweeds (*Fucus* spp., *Ascophyllum nodosum* and kelps).
- shingle beaches - the more stable areas of shingle support characteristic species such as Sea Beet, Sea Mayweed (*Matricaria maritima*), Sea Campion and Curled Dock (*Rumex crispus*).
- Sandbanks which are slightly covered by sea water at all times – there is a known occurrence of sand/gravel beds in the area from Kerry Head to Beal Head.
- sand dunes - a small area of sand dunes occurs at Beal Point. The dominant species is Marram Grass (*Ammophila arenaria*).

Flowing into the estuaries are a number of tidal rivers.
Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon being broad, generally slow-flowing and naturally eutrophic; the Fergus being smaller and alkaline; while the narrow, fast-flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Seminatural habitats, such as wet grassland, wet woodland and marsh occur by the rivers,

however, improved grassland is most common. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes and sedges and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*Carex pallescens*).
Floating river vegetation characterised by species of Water-crowfoot (*Ranunculus* spp.), Pondweeds (*Potamogeton* spp.) and the moss *Fontinalius antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to county Limerick.
Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with sally (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis.* The herbaceous layer consists of tall perennial herbs. A fringe of Bulrush (*Typha* sp.) occurs on the riverside of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species with occasional Oak (*Quercus robur*), Elm (*Ulmus glabra, U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich.
Woodland is infrequent within the site, however Cahiracon Wood contains a strip of old Oak woodland. Sessile Oak (*Quercus petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmeteia*) and Pendulous Sedge (*Carex pendula*).
In the low hills to the south of the Slievefelim mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of Birch (*Betula* spp.), Hazel, Oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and Willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora feature prominent Greater wood-rush and Bilberry (*Vaccinium myrtillus*) with a typical range of woodland herbs. Where there is more light available, Bracken (*Pteridium aquilinum*) features.
The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, Oak and Birch. There is a good scrub layer with Hawthorn, Willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The hazel is actively coppiced in places.
There is a small area of actively regenerating cut away raised bog at Ballyrorheen. It is situated approx. 5km north west of Cappamore Co. Limerick. The bog contains some wet areas with good moss (*Sphagnum*) cover. Species of particular interest include the Cranberry (*Vaccinium oxycoccos*) and the White Sedge (*Carex curta*) along with two other regionally rare mosses including *S. fimbriatum*. The site is being invaded by Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of rhododendron has greatly reduced the overall value of the site.
A number of plant species that are Irish Red Data Book species occur within the site - several are protected under the Flora (Protection) Order, 1999:
- Triangular Club-rush (*Scirpus triquetrus*) - in Ireland this protected species is only found in the Shannon Estuary, where it borders creeks in the inner estuary.
- Opposite-leaved Pondweed (*Groenlandia densa*) - this protected pondweed is found in the Shannon where it passes through Limerick City.
- Meadow Barley (*Hordeum secalinum*) - this protected species is abundant in saltmarshes at Ringmoylan and Mantlehill.
- Hairy Violet (*Viola hirta*) - this protected violet occurs in the Askeaton/Foynes area.
- Golden Dock (*Rumex maritimus*) - noted as occurring in the River Fergus Estuary.
- Bearded Stonewort (*Chara canescens*) - a brackish water specialist found in Shannon Airport lagoon.
- Convergent Stonewort (*Chara connivens*) - presence in Shannon Airport Lagoon to

be confirmed.
Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found but none were seen in 1993/94.
Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96); Teal (2,319; 1995-96); Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1062; 1995/96), Curlew (1504; 1995/96), Redshank (3228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.
A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4010 individuals at Loop Head, 1987)
There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary consisting of at least 56-68 animals (1996). This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. Otter, a species also listed on Annex II of this directive, is commonly found on the site.
Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon while the Mulkear catchment excels as a grilse fishery though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of Lamprey.
Two additional fish of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon.
Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.
There is a wide range of landuses within the site. The most common use of the terrestrial parts is grazing by cattle and some areas have been damaged through overgrazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus Estuary). Further, reclamation continues to pose a threat as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale.
In the past, Cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.
Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory - except in the upper estuary, reflecting the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences by industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.
Fishing is a main tourist attraction on the Shannon and there are a large number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.
This site is of great ecological interest as it contains a high number of habitats and

species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.
17.05.2005

An Roinn Seirbhísí Uisce
Comhairle Contae Chiarraí,
Ráth Teas,
Trá Lí, Co. Chiarraí.

Water Services
Kerry County Council,
Rathass,
Tralee, Co. Kerry.

COMHAIRLE CONTAE CHIARRAÍ
KERRY COUNTY COUNCIL

Guthán | Tel 066 7183503 Faics | Fax 066 7181639 Rphost | Email waterservices@kerrycoco.ie Suíomh | Web www.kerrycoco.ie

PMcC.JOC

29 May 2009

Mr. Eamon Meskell,
Regional Manager,
National Parks and Wildlife Services,
Department of the Environment Heritage and Local Government,
Muckross House,
Killarney,
County Kerry.

Dear Mr. Meskell,

In accordance with the Waste Water Discharge (Authorisation) Regulations 2007 (S.I. No. 684 of 2007), Kerry County Council intend to apply to the Environmental Protection Agency for a Wastewater Discharge Licences for the waste water networks serving the following agglomerations in County Kerry: **Abbeydorney, Annascaul, Baile an Fhéiritearaigh, Ballyduff, Ballylongford, Castlegregory, Castlemaine, Causeway, Fieries, Knightstown, Lixnaw, Moyvane** and **Rathmore**. In each case the agglomerations include the town and the developed surrounding area. The waste water network also includes the relevant waste water treatment plant (excluding Ballylongford).

The receiving waters for waste water network discharges and the locations of the respective waste water treatment plants are shown in the following table.

Agglomeration	Receiving Waters	WWTP Location
Abbeydorney	Tributary of Shannow RIver	Abbeydorney
Annascaul	via Owenascaul River to Dingle Bay	Annascaul
Baile an Fhéiritearaigh	via Unnamed River to Smerwick Harbour	Baile an Fhéiritearaigh
Ballyduff	Cashen River	Ballyduff
Ballylongford	via Ballyline River to Ballylongford Bay	Ballylongford
Castlegregory	via tidal stream to Tralee Bay	Castlegregory
Castlemaine	River Maine	Castlemaine
Causeway	Unnamed tributary of Crompaun River	Causeway
Fieries	Fieries Stream	Fieries
Knightstown	Valentia Harbour	Knightstown
Lixnaw	Lixnaw Canal to Crompaun River to	Lixnaw

	Cashen River	
Moyvane	Moyvane River	Moyvane
Rathmore	River Blackwater	Rathmore

We have been requested by the EPA to correspond with the National Parks and Wildlife Service in relation to a determination as to the likelihood of discharges from the waste water works having a significant effect on a European site.

We would be obliged if you could advise us if the discharges are deemed likely to have a significant effect on a European site and if so, please advise if any appropriate assessment of the implications for the designated site in view of the sites conservation objectives, must be carried out.

The applications have to be made to the EPA by 22nd June 2009. We look forward to hearing from you.

Please contact me at the above address if you need any clarification on this matter.

Sincerely,

Pat Mc Carthy

Pat McCarthy.
Executive Engineer,
Water Services Operations

Copy to:

Ms Mary Boothman,
Development Applications Unit,
Department of the Environment, Heritage and Local Government,
Dún Séine,
Harcourt Lane,
Dublin 2.

F.2 Tabular Data on Drinking Water Abstraction Point(s)

Applicants should submit the following information for each downstream or downgradient drinking water abstraction point. The zone of contribution for the abstraction point should be delineated and any potential risks from the waste water discharge to the water quality at that abstraction point identified.

ABS_CD	AGG_SERVED	ABS_VOL	PT_CD	DIS_DS	EASTING	NORTHING	VERIFIED
Abstraction Code	Agglomeration served	Abstraction Volume in m^3/day	Point Code Provide label ID's	Distance Downstream in meters from Emission Point to Abstraction Point	6E-digit GPS Irish National Grid Reference	6N-digit GPS Irish National Grid Reference	Y = GPS used N = GPS not used

Note: Attach any risk assessment that may have been carried out in relation to the abstraction point(s) listed.

An individual record (i.e. row) is required for each abstraction point. Acceptable file formats include Excel, Access or other upon agreement with the Agency. A standard Excel template can be downloaded from the EPA website at www.epa.ie. http:///This data should be submitted to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, B.5, C.1, D.2 and E.3.

Attachment F.2 should contain any supporting information.

Attachment F.2 Tabular Data on Drinking Water Abstraction Point(s)

There are no public drinking water abstraction points downstream or downgradient of the Ballyduff agglomeration Waste Water Works.

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

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 Phase I of this scheme;

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

An assessment of the likely Phase II 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 for handling and treatment 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-BF-06.

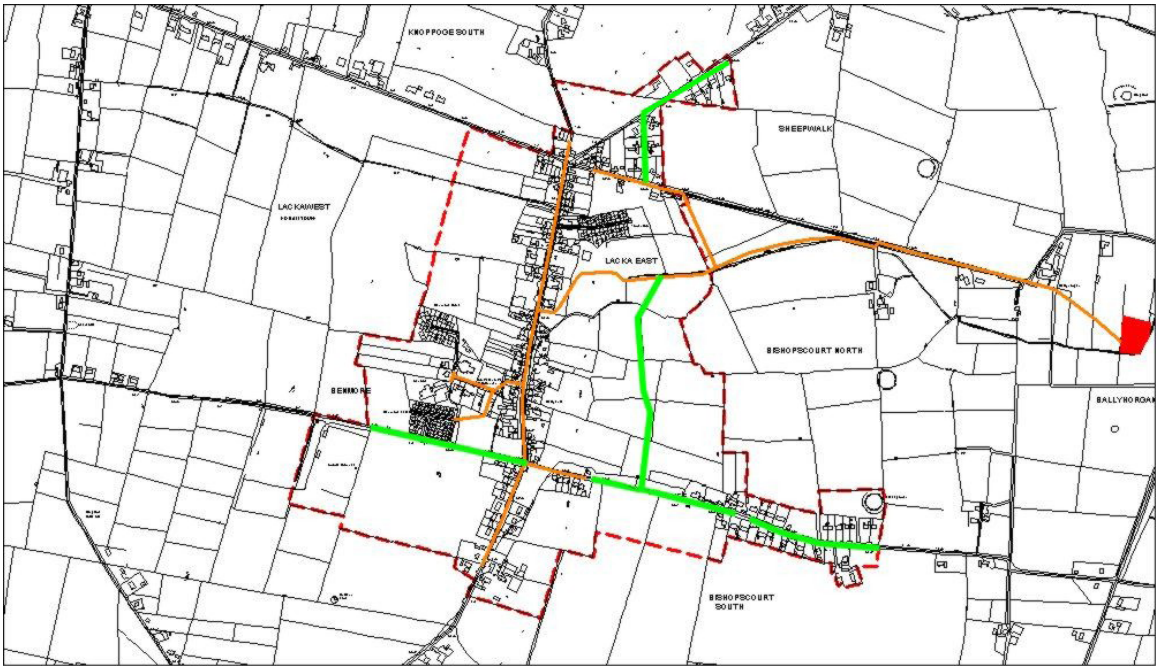


Figure 1 - Proposed Network Extensions

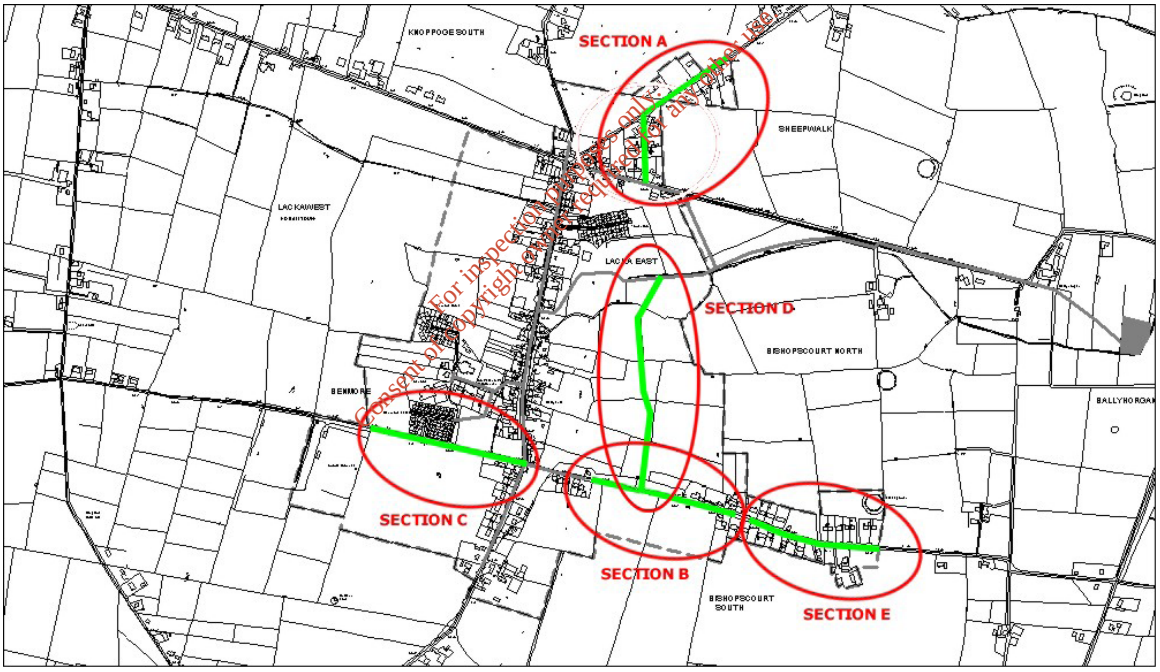


Figure 2 - Proposed Network Extension Phases

Ballyduff Phase I Works

The Phase I works will cater for the immediate needs of the village. The extensions are named A to E as illustrated on Figure 2.

The areas of zoned land to the north and to the south east of Ballyduff town centre are not drained by the existing sewerage network. The following sewerage extensions are proposed to serve these zoned areas;

SECTION A - Sheepwalk Housing Estate Sewer Extension (Road R551 to Lisseton)

A 225 mm sewer laid at available gradient along the Sheepwalk estate will have adequate capacity to serve the zoned areas to the north of Ballyduff town centre. The existing 150mm diameter sewers serving the Sheepwalk/Lacka East areas should be upsized to 225 mm diameter sewers between manholes EF 14.4 (1201) and EF 14 (4002). A 225mm gravity sewer, with a pumping station at the end, is the most economical way to serve the houses heading north along the Ballybunion Road. The rising main should discharge to manhole PF 3.

SECTION C - Benmore Sewer Extension
A 225 mm sewer, 480 metre long laid at available gradient offered by the topography along the road adjacent to the sports grounds in Benmore would have sufficient capacity to cater for surrounding future developments. The extension would connect to the existing sewer system at manhole EF 32 (9502).

SECTION E - Farranedmond Housing Estate Sewer Extension and Pumping Station (Road to Ballyhorgan Marshes)

It is not possible to transfer flows from the southeastern zoned area to the existing sewerage network by gravity pipeline due to topographic constraints along the route. A 225mm sewer laid at available gradient along the Farranedmond estate will have sufficient capacity to serve the existing 30 houses.

A pumping station and a 750 metre length of 100 mm diameter rising main would be required to transfer flows accumulated by the gravity network to the existing sewerage network in Benmore, at manhole EF 32.5 (1501). The existing 150 mm diameter sewers between manholes EF 35 (8301) and EF 29 (9701) along the main street should be upsized to 225 mm diameter sewers and connected to the existing sewer network at manhole EF 29 (9701). Upsizing the existing sewer pipes reduces flooding and surcharging as well as eliminates infiltration should there be any.

It is recommended to up size all 150mm trunk main sewers to 225mm, as in the following table:

Manhole References for Sections Requiring upsizing
EF 32.5 (1501) – EF 32 (9502)
EF 29.2.2 (7702) – EF 29.2(8703)
EF 29.1 (9704) – EF 29 (9701)
EF 27.8 (0303) – EF 27.3 (0002)
EF 35 (8301) – EF 29 (9701)

It is recommended that these proposals be carried out as part of the Phase I upgrade and rehabilitation works for Ballyduff Sewerage Scheme.

Ballyduff Phase II Works

The Phase II network extensions open up development land and can be constructed as required by development.

The following sewerage extensions are proposed to serve the areas of zoned land to the East of the town centre to allow for the full development of the catchment.

Section B – Bishopscourt South
204 metres of 225mm diameter sewer laid at available gradient will have adequate capacity to serve properties to the west of Farranedmond Estate. This foul line which travels northwest along the Bishopscourt Road merges with another proposed 225mm foul sewer from the opposite direction. The two sewer lines join at manhole PF 14.

SECTION D - Benmore/Bishopscourt Sewer Extension
530 metres of 225 mm diameter gravity sewer laid at available gradient will have sufficient capacity to cater for new developments between Farranedmond and Lacka East. The proposed sewer would cut across the fields between Benmore and Bishopscourt North and would connect to the existing sewer network at manhole EF 16 (3001). The route shown for this sewer is indicative, as a prospective developer may decide to route the line differently to suit a development.

4.3 Proposed Storm Network

In general, the area within the development boundary slopes downwards towards the east of the town. A local stream was used as discharge points for the surface water. Proposed pipe diameters vary in size from 225mm to 450mm. The proposed storm network layout and long sections for Ballyduff are detailed in Drawing Nos. 20367-BF-13 and 14. Details of the surface water network calculations are shown below.

Area (Ha)	QBAR (l/s)	Pipe Length (m)	Gradient 1 in X)	Capacity (Colebrook - White) (l/s)	Pipe Diam (mm)	Sewers
0.046	55.492	180	42	73	225	PS1.7-1.5
0.111	122.238	273	61	135	300	PS1.7-1.5
0.053	63.606	272	49	65	225	PS5.11-5.8
0.103	114.786	180	105	173	375	PS5.7.2-5.7
0.161	170.326	146	104	237	450	PS5.7-5.5
0.177	185.252	206	57	380	450	PS5.5-5.1
0.031	39.142	80	121	41	225	PS3.8-3.7
0.078	89.660	176	138	151	375	PS3.7-3.5
0.124	135.532	180	72	209	375	PS3.5-3.3
0.146	156.455	55	40	280	375	PS3.3-3.2
0.164	173.340	60	43	270	375	PS3.2-3.1
0.031	38.905	114	58	60	225	PS2.4+2.1
0.028	35.762	302	20	102	225	PS4.6-4.1

Any substantial development should have its own surface water drainage system, connected to an individual soak pit as per SUDS, primarily as a method of

preventing pollution, as opposed to flooding or watercourse issues. The land drains in the area could be used in conjunction with SUDS as suitable discharge points. This would have the added benefit of diluting the effluent from the treatment plant.
The topography of the village ensures that there should be no risk of flooding to properties. However it is recommended that Kerry County Council develop and enforce a sustainable drainage policy as outlined in Section 2.11. It is also inevitable that a certain amount of surface water could enter the foul network system, particularly from roofs and yards connected to existing septic tanks. Soak pits should be installed by householders to ensure minimum infiltration of storm water into the foul network.

PROPOSED TREATMENT

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 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 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.

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.

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 ultimate design p.e for Ballyduff in 2026 is 1300 p.e. as determined by the population projections in Appendix 1 of this report. It is proposed that the works is phased as follows; Phase 1 satisfying medium growth of the village and Phase 2 satisfying high growth of the village, should this situation occur.
The basic design parameters for the wastewater treatment plant are therefore summarised as follows:

Table 3 – Ballyduff Influent Load

Parameter	Phase 1	Phase 2
Population Equivalent	1300	1950
Dry Weather flow (l/s)	3.39	5.08
Average BOD (kg/day)	78.00	117.00
Total Phosphorus (kg/day)	2.34	3.51
Total Nitrogen	14.30	21.45
Suspended Solids	91.00	136.50

Required Treatment

The wastewater collected at Ballyduff consists of primarily domestic wastewater, which will need screening and treatment. It is proposed to treat the wastewater at Ballyduff using a CAST system (Compartmentalised Aerated Septic Tank). This 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 of the Cashen River at the discharge location. The assimilative capacity at this location is very large and indicates that minimal removal of pollutants is required on environmental grounds.

The CAST 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 secondary treatment system, downstream of the CAST tanks.

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.

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.

The CAST system can either be a single tank, or alternatively a series of tanks. In the case of Ballyduff, it is proposed to use a series of prefabricated septic tanks, with additional de-gasification chamber, downstream. This would be more economical than a single cast in-situ tank. The arrangement chosen is a single tank (1/3 of total required volume) upstream of two tanks in parallel (2/3 of total required volume).

In practice this will mean that the full volume is available under normal dry weather flow conditions, with the first tank catching the majority of the solids. Under storm conditions, however, flow through the first tank will be capped, and flows in excess will go directly to the two downstream tanks. This arrangement will aid maximum capture of the “first flush” due to a storm event and ensure minimum wash out of solids from the tanks.

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. The effluent from the CAST system can discharge to a land drain which is currently located to the east of Ballyduff. This land drain flows into the Cashen River which is designated as a sensitive water under the Urban Wastewater Treatment Regulations. The land drain is not an aquatic ecosystem, and therefore the Cashen has been taken as the receiving water. The land drain itself is 940m long and the oxygen rich effluent from the CAST system will receive further polishing along the drain before reaching the Cashen River.

Wastewater Treatment Plant Site

The proposed treatment plant site is adjacent to the existing wastewater treatment plant, to the East of the village, some 1500m away from its center. The nearest housing is 130m away. The current treatment plant is an uncovered coarse screen and Imhoff tank. The proposed site is 3,120 m2, in addition to the existing site.

Outfall

In terms of potential outfall locations, there are two options, which will be examined. These are:

1. Use existing outfall arrangement (Land drain)
2. Construct new outfall to Cashen River

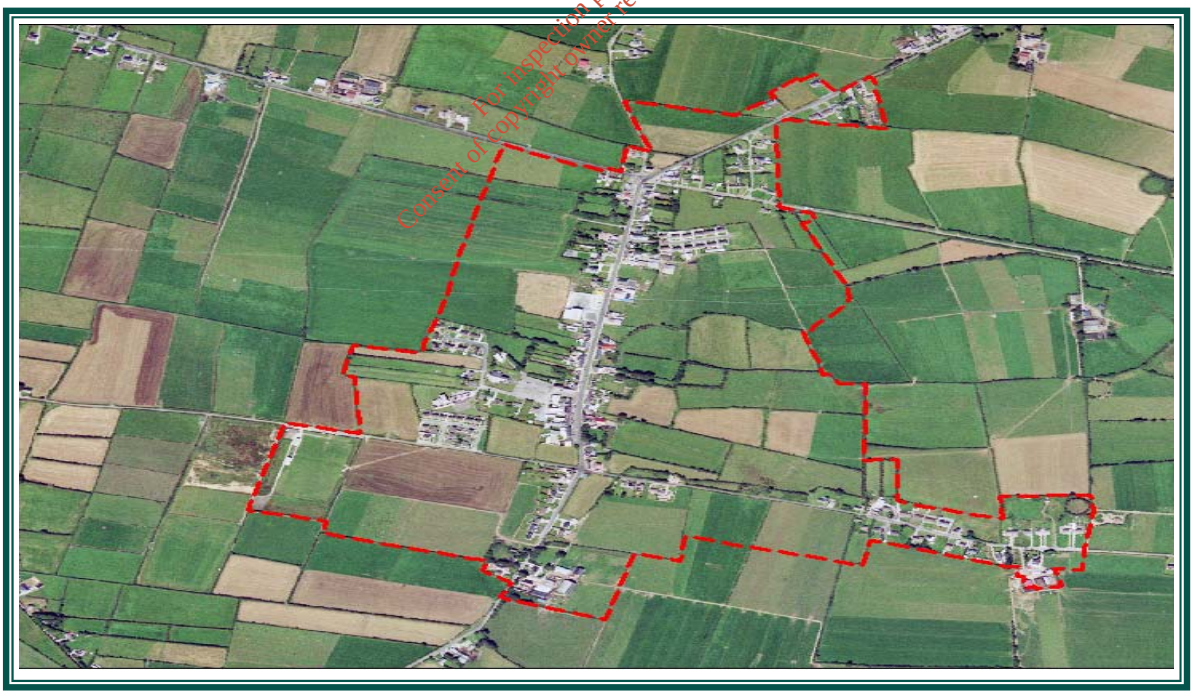
A discharge to the adjacent land drain would be beneficial in terms of the polishing of the effluent as it travels down the drain vis avis the current situation to the Cashen River. There would be an improvement in the water quality in the land drain insofar as the effluent would be oxygenated and de-gassified, and

Kerry County Council

Comhairle Contae Chiarraí

COUNTY KERRY WASTEWATER AND SLUDGE PROJECT - ADVANCE STUDY

PRELIMINARY REPORT
BALLYDUFF



Revision B - September 2007

Nicholas O'Dwyer
CONSULTING ENGINEERS

KERRY COUNTY COUNCIL

COUNTY KERRY WASTEWATER AND SLUDGE PROJECT
ADVANCE STUDY

BALLYDUFF PRELIMINARY REPORT

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Dublin 14.

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	01/04/07	ND	11/04/07
B	Incorporate Client's Comments	MR	10/09/07	MD	10/09/07	ND	10/09/07
C							
D							

CONTENTS

LIST OF DRAWINGS

1.0 EXECUTIVE SUMMARY

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

The existing population equivalent at Ballyduff is estimated at 694 p.e. Populations growth figures indicated the population equivalent of Ballyduff rising to 1,006 p.e by the year 2026.

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

Due to the large assimilative capacity of the Cashen River, combined with the relatively small population, only a basic wastewater treatment system is required, and it is proposed to use a CAST system.

The estimated capital costs for the provision of network repairs, upgrades and extensions, with a CAST Treatment system, is €2,199,358 (inc VAT).

The whole life costs of the scheme amount to €9,666 per existing house, which provides a value for money cost.

The capital cost of the proposed Storm Network is €567,985 (inc VAT).

2.0 PLANNING AND INFRASTRUCTURE ISSUES

2.1 General

Ballyduff is a village in North Co. Kerry, located on the R551 approximately 10 kilometres due West of Listowel and 20 kilometres North of Tralee. The village is located on hills above Cashen Bay, where the River Feale flows to the sea at the mouth of the River Shannon, as illustrated in Figure 2-1. The village is generally set out along a main street, between two crossroads. There is a Roman Catholic Church, a primary school, a Community Center and various other amenities in the village.

Near Ballyduff, a round tower reaches a height of 28 m. This is the only complete round tower in Kerry, and possibly dates from the late 10th or early 11th centuries. Ballyduff is famed for it's sporting past and present and is very successful in both Gaelic Football and Hurling, including winning the first All Ireland Hurling Final in 1891.

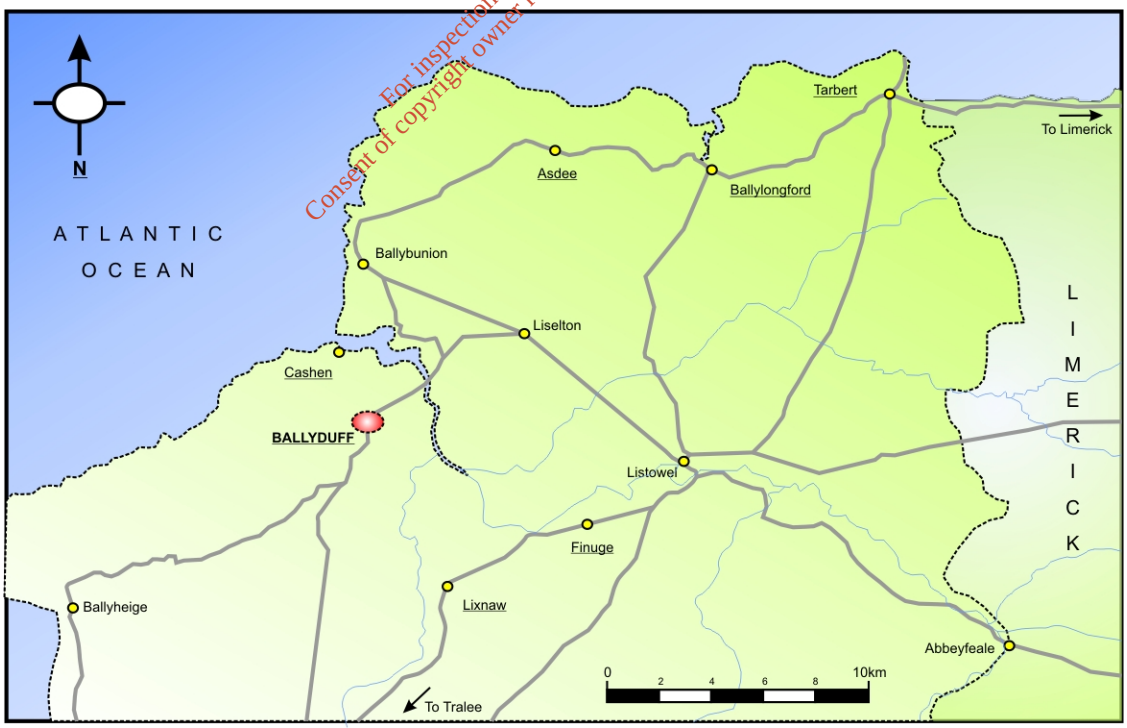

Figure 2-1– Location Plan

The Development Boundary, as agreed with the Planning Section of Kerry County Council, is illustrated in Figure 2.2 and shown on Drawing 20367-BF-01. The Aerial Photography of the village is illustrated in Figure 2.3, showing the largely agricultural nature of the area.

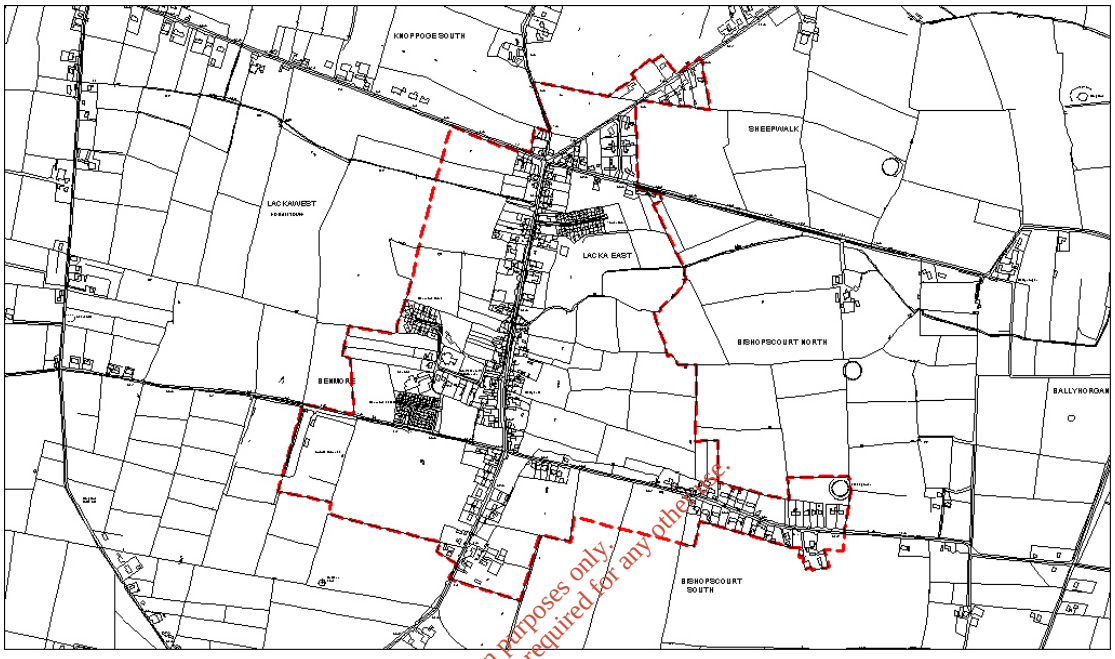

Figure 2-2 – Ballyduff Development Boundary

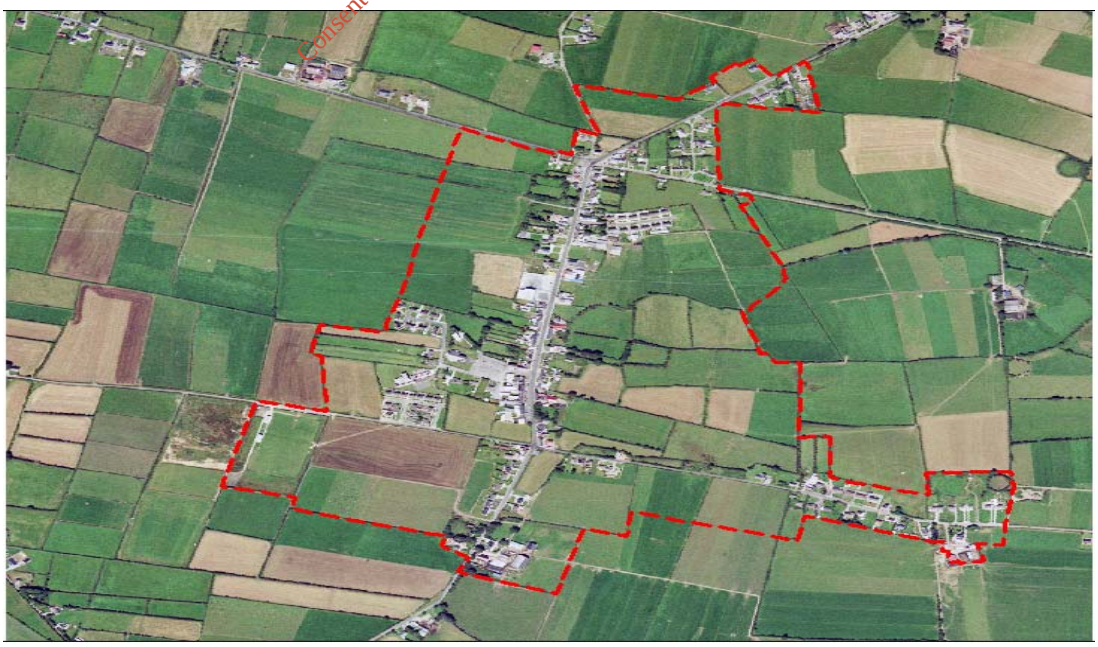

Figure 2-3 – Aerial Photography of Ballyduff

2.2 Topography

The general topography is illustrated in Figure 2.4. As can be seen, the topography of the area generally slopes down towards the East, with a general depression in the central Eastern area. The results of a detailed topographical survey are presented in Appendix 2.

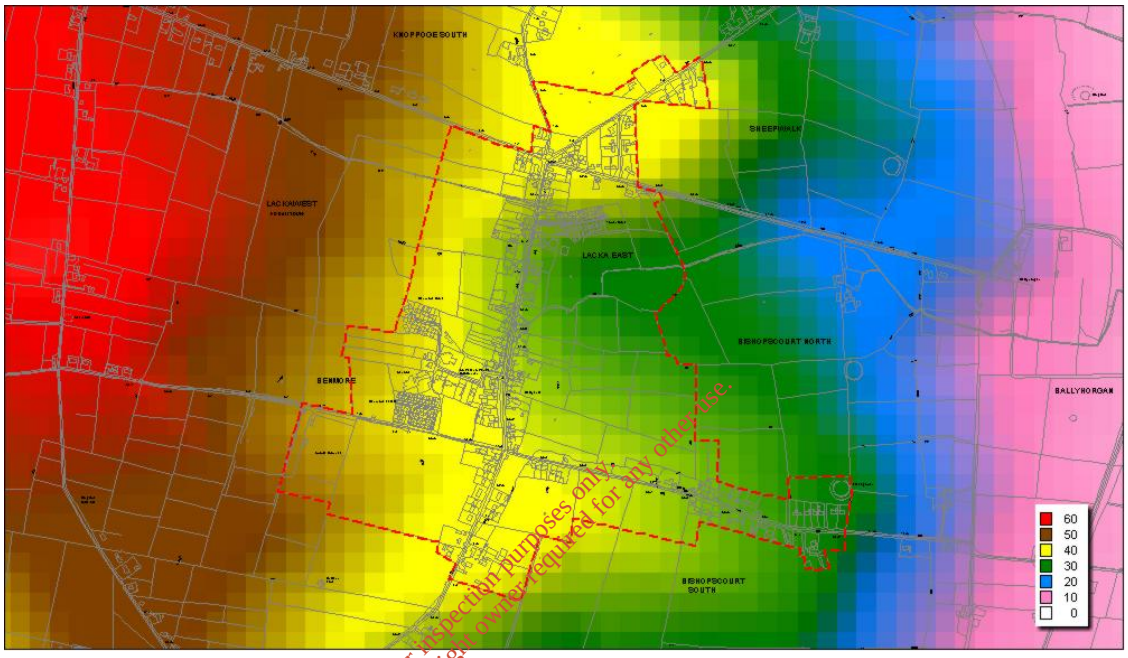

Figure 2-4 – Topography from Digital Elevation Model

2.3 Planning Constraints

The village is served by a water distribution network and a wastewater collection network. There are no particular environmental designations within the village Development Boundary and as such, the primary constraints are that of blending in with the surrounding village and in meeting the policies of the County Development Plan. There are several protected structures within the village.

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 Dec 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 Ballyduff 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 Ballyduff, 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". Listowel will have Enterprise/Industrial/Services sites identified and Listowel will serve as a Development Hub to act as a catalyst for development within its hinterlands.

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. Ballyduff is included in the settlements where infrastructure will be upgraded under the water services investment programme in the next 5 years.

2.5 Watercourses

Ballyduff is situated 2.5 km east of the Cashen River which is an important salmon and sea trout river. The River rises in the mountain district of North Co Cork and flows westerly for 75 km through the county towns of Abbeyfeale and Listowel and enters the sea at Cashen. For the final 10 kms of its course, it is known as the Cashen River. Its main tributaries, flowing from both North and South, combine to in excess of 160 km of river.

Ballyduff is served by an existing combined gravity system. The system drains to an existing wastewater works. The effluent from the plant discharges via outfall to a canal that in turn discharges to the Cashen River to the East.

The Cashen is designated as a Special Area of Conservation (SAC), under the Lower River Shannon SAC (Site Code 002165) as illustrated in Figure 2.5, and is also classed as a "Sensitive" river under the Urban Wastewater Treatment Regulations (S.I. 254 of 2001).

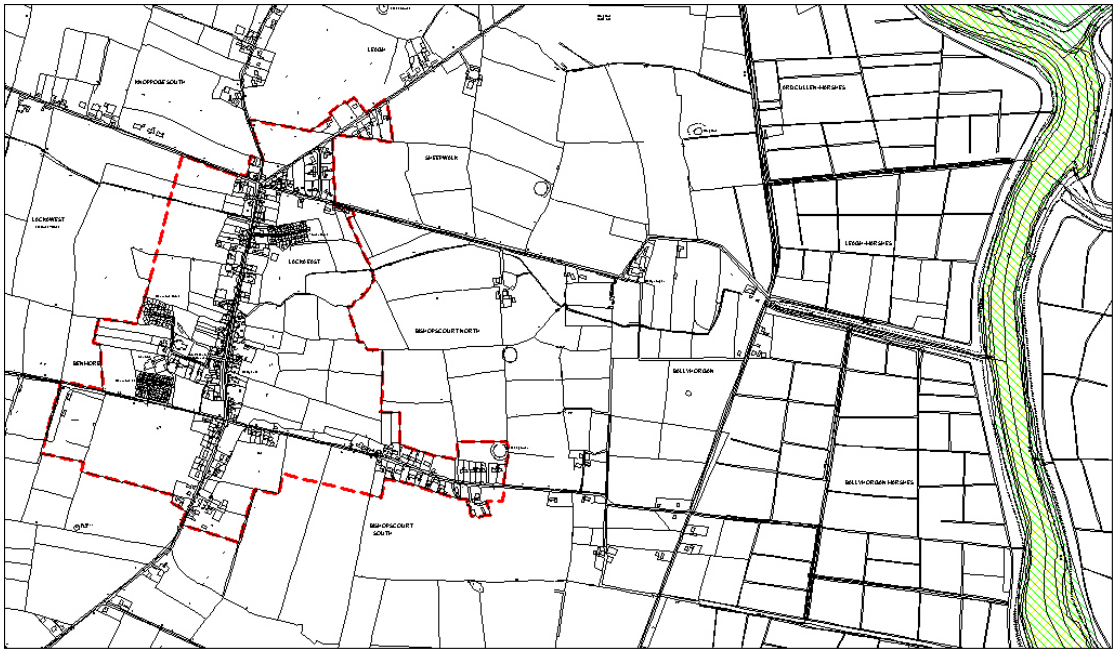

Figure 2-5 – Water courses

2.6 Existing Wastewater Loads

To determine the actual flows and loads that arrive at the existing treatment plant in Ballyduff, an independent flow and load survey was 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 31st January to Tuesday 7th February 2006 in Ballyduff. The analysis was carried out using 24 hour time proportional composite samples, thus one sample per day. Monitoring was carried out at the first suitable manhole upstream of the wastewater treatment plant. The results of the survey are presented in Figures 2.6 - 2.8 below. The various parameters monitored in the survey are fully explained in Section 5.1.1.

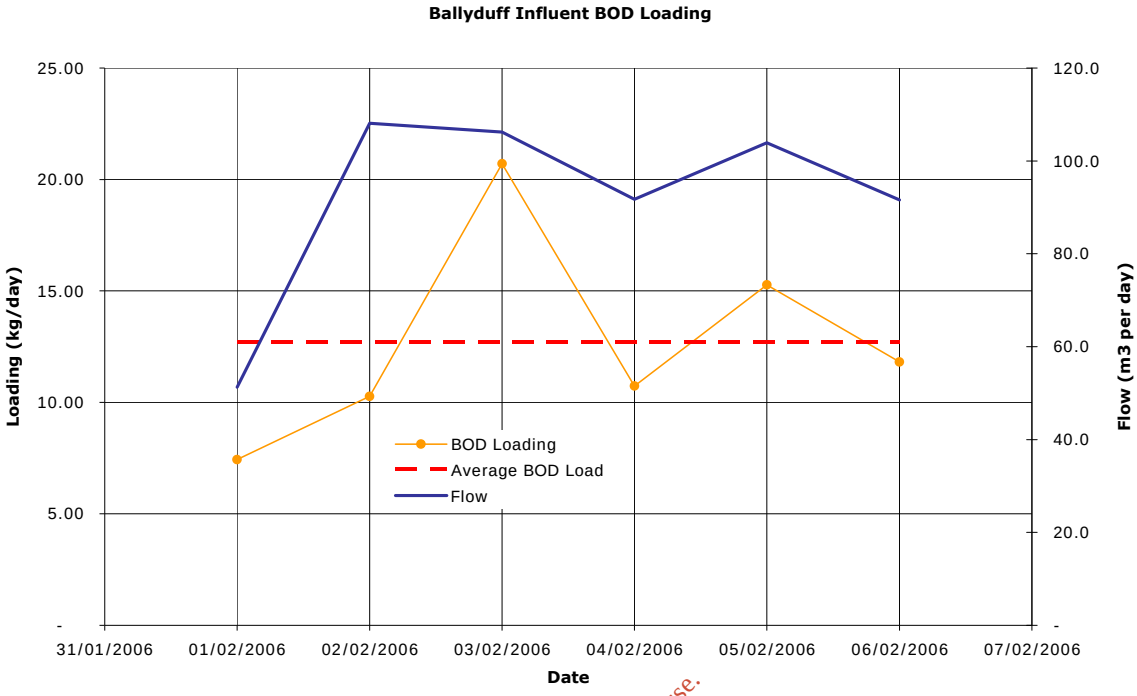

Figure 2-6 – Ballyduff Influent BOD Loading

BOD concentrations ranged from 95 to 195 mg/l with an average BOD concentration of 138 mg/l. This would be considered a weak domestic influent as typical expected concentrations would be ranging between 250 mg BOD/l to 300 mg BOD/l. The highest load occurred on a Friday.

The fact that the influent is weak is to be expected given that the system is a combined system, and the dilution would possibly be due to infiltration and/or surface water connections.

Table 2.1 – Influent BOD Data

	BOD Loading (kg/day)	Equivalent Population (Based on 45g/c.d)
Average	12.71	282
Max	20.71	460
Min	7.43	165

The residential population equivalent as determined by a house count, as described in Section 3.2, is 694. The residential p.e. estimated by the Census in 2002 was 614 p.e. The average BOD load over the seven day period is therefore low when compared with the existing population. There are currently no

industrial discharge licences in Ballyduff that have been issued by Kerry County Council, however there is co-op/dairy activity in the village, but this was not in operation during the monitoring survey.

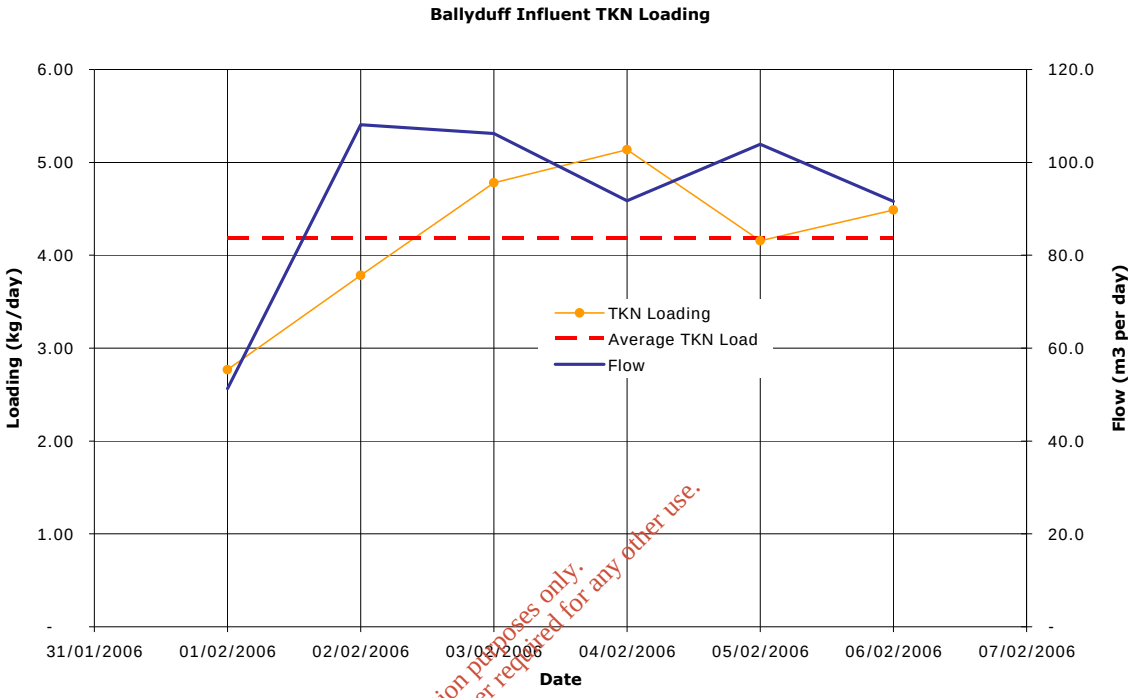

Figure 2-7 – Ballyduff Influent Total Kjeldahl Nitrogen Loading

Total Kjeldahl Nitrogen (TKN) is the sum of organic Nitrogen and Ammonia. The average Total Kjeldahl Nitrogen concentration in Ballyduff was 47.0 mg/l and is typical of normal municipal concentrations.

Table 2.2 – Influent TKN Data

	TKN Loading (kg/day)
Average	4.19
Max	5.14
Min	2.77

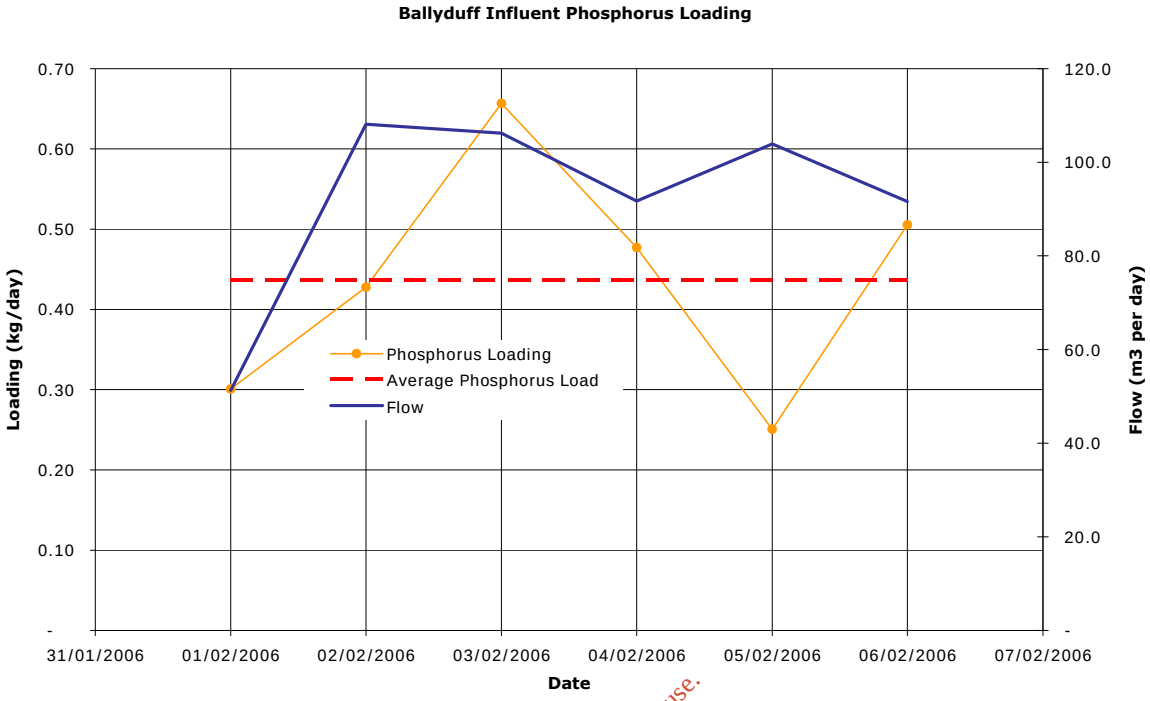

Figure 2-8 - Ballyduff Influent Total Phosphorus Loading

The average Total Phosphorus concentration in Ballyduff was 4.86 mg/l. Typical domestic concentrations would be 8.0 mg/l, and therefore, this would be considered a weak municipal influent.

Table 2.3 – Influent Total Phosphorus Data

	Total Phosphorus Loading (kg/day)
Average	0.44
Max	0.66
Min	0.25

Phosphorus and BOD concentrations were consistent with weak municipal effluent streams, whereas the TKN levels are more concentrated. Flow volumes ranges from 51 to 127 cubic metres per day. During the sampling period, no rainfall was recorded.

2.7 Existing Water Supply Infrastructure

Ballyduff is currently serviced by a public water supply which serves a population of approx 1,524 with a surface water supply delivering 2,584 m^3/day of water. The water main runs along the main road of the village and offers a considerable supply to the East and West of the town's two crossroads. This is illustrated on Figure 2-9.

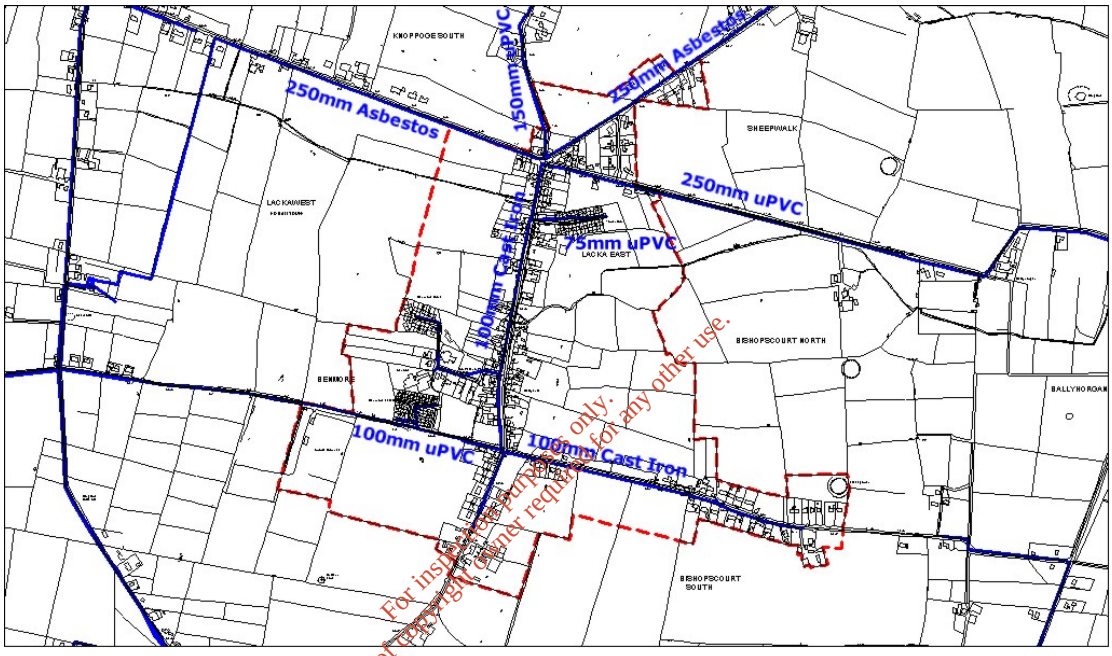

Figure 2-9 - Existing Water Distribution Network

2.8 Existing Wastewater Infrastructure

Ballyduff is served by an existing combined gravity sewer, the majority of which is 225mm in diameter. The network has been altered by developers in certain locations to facilitate connections and there have been reported problems of choking and flooding in the system. The system drains to a wastewater treatment works, which consists of a coarse inlet screen and an Imhoff tank, located approximately 1,500m to the East of the village.

The effluent from the plant discharges via outfall to a canal that in turn discharges to the Cashen River. The plant currently has a nominal design capacity of 300 p.e. but suffers from overloading considering the existing population. Excessive grease volumes have also been reported at the site. The wastewater collection network is illustrated on Figure 2-10 and shown on Drawing No 20367-

BF-02. The existing wastewater treatment plant is shown Drawing No 20367-BF-05.

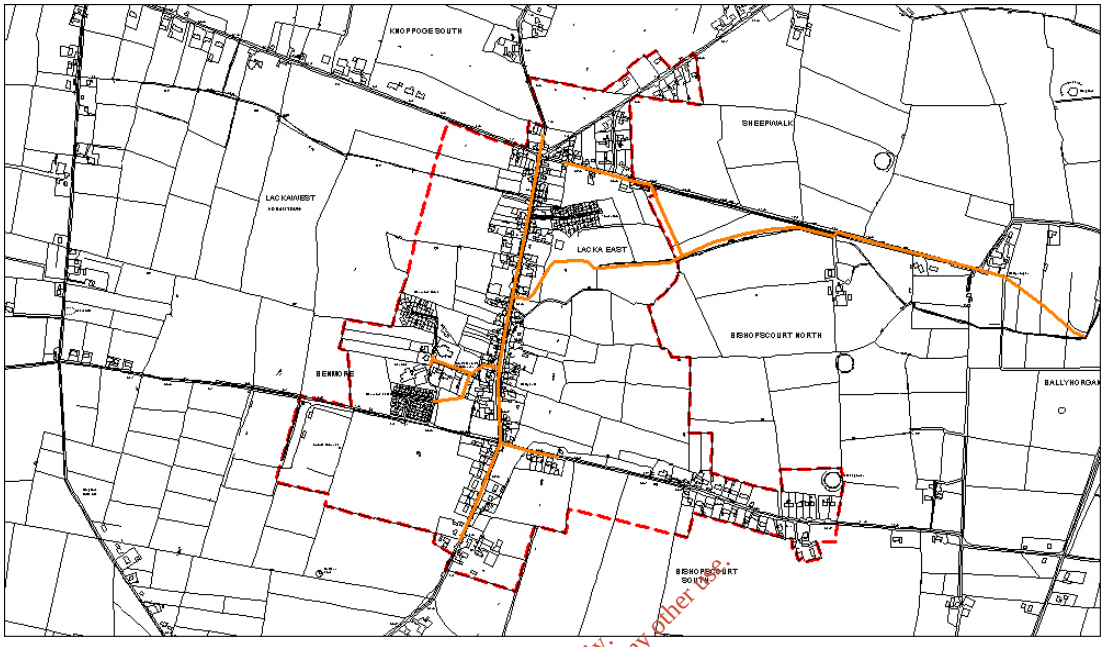

Figure 2-10 - Existing Wastewater Collection Network

Due to limitations regarding available information on the existing collection and treatment systems in Ballyduff, 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.

- Wastewater Treatment Works Asset Survey

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

2.8.1 *Ballyduff Existing Sewerage Network*

The village of Ballyduff is served by a combined drainage network consisting of approximately 3,666 linear metres of gravity pipelines. The network is primarily made up of 225 mm diameter concrete pipelines. The system gravitates flow to the wastewater treatment plant located approximately 1.5 km to the East of the village centre.

A summary of the existing sewerage network is given below in Table 2.1.

Table 2.1 - Summary of Existing Ballyduff Sewerage Network

System Type	Pipeline Diameter (mm)					Total Length (m)
	150 ≤	225	250	450	600	
Foul/Combined	1504	2142	20	-	-	3666

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 and 1 the least, to each sewer surveyed, in accordance with the *"Sewerage Rehabilitation Manual"* published by WRC. The structural and service grades assigned in Ballyduff are summarised below by length of sewer in Tables 2.2 and 2.3 respectively.

Table 2.2 - Summary of Structural Grades in Ballyduff

System Type	Structural Grade By Length (m)				Total (m)
	5	4	<4	Not Surveyed	
Foul/Combined	87	482	1680	1417	3666

Table 2.3 - Summary of Service Grades in Ballyduff

System Type	Service Grade By Length (m)				Total (m)
	5	4	<4	Not Surveyed	
Foul/Combined	-	967	1282	1417	3666

It can be seen from Tables 2.2 and 2.3 that the existing sewerage network in Ballyduff is in poor structural condition (45.6% of surveyed network less than grade 4) and poor service condition (35% of surveyed network less than grade 4). The structural and service grades assigned to the existing sewers in Ballyduff

are shown in Drawing No. 20367-BF-11 and 20367-BF-12 respectively. It should be noted that approximately 395 of the lines were not surveyed due to access issues.

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 from 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. Although there is an existing treatment plant at Ballyduff, it is currently overloaded and areas to the North and South East of Ballyduff are currently unconnected to the public sewer.

2.9.1 *Package Wastewater Treatment Plants*

The majority of houses are connected to the public sewer, however, some houses to the North and to the South East are not. A handful of these houses have installed proprietary package treatment units. These units 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 of a higher standard than can be achieved with a septic tank.

2.9.2 *Private Septic Tanks*

The existing residential houses in Ballyduff which not connected to the public sewer are mainly serviced by septic tanks typical of many rural towns and villages in Ireland. A significant proportion of these tanks would have been constructed before 1990 (i.e. 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 of septic tanks 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, thereby restricting housing density

2.10 Existing Surface Water Infrastructure

There is currently no existing surface water infrastructure at Ballyduff. A number of the newly constructed houses may use small bore pipework to collect surface water separately, however, impermeable material such as tarmac and paved areas will result in a significant proportion of rainwater contributing to immediate surface runoff. The impact of stormwater on the public sewer on the Ballyhoogan Road was stated as being a significant problem. Flooding has occurred in recent years due to high levels of surface water entering the network.

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, however it is likely that developments in Ballyduff will continue in line with what has currently been developed, i.e. small once off housing or medium density developments.

Despite this, it is recommended that a sustainable drainage policy be developed and enforced by Kerry County Council for all new developments within Ballyduff. 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 dwellings should incorporate soak pits for rainwater, primarily as a method of preventing flooding, due to the high volumes of surface water currently entering the public sewer in Ballyduff.

Table 2.3 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 1336mm. These catchments characteristics were obtained from the Flood Studies Report, 1975.

A Storm sewer network to collect this permissible runoff has been designed and is shown on Drawing No 20367-BF-13. The design philosophy is detailed in Appendix 3.

Table 2.3 – Permissible Outflow Rate

Soil Class	4	
Soil Index	0.45	
Development Area (ha)	Permissible Outflow Rate	
	l/s	l/s/ha
0.5	7.77	15.53
1	14.39	14.39
2	26.67	13.33
3	38.26	12.75
4	49.42	12.36
5	60.28	12.06
6	70.90	11.82
7	81.33	11.62
8	91.59	11.45
9	101.71	11.30
10	111.71	11.17

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 Ballyduff adequate to serve the village for a period of 20 years. Although the town currently has existing wastewater treatment infrastructure, the network suffers from flooding and the treatment plant is currently overloaded and does not meets today's standards in terms of Health and Safety for operators or in terms of the effectiveness of the treatment.

Preliminary treatment (including screening and grease removal) followed by primary settlement would be required as a minimum. The village of Ballyduff would benefit from an extended wastewater collection system and improved treatment facilities, as it would allow the town to infill and develop from a socio-economic point of view, in line with the objectives of the County Development Plan.

3.2 Design Population

An existing house and commercial premises count was carried out within the development boundary of Ballyduff 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
Petrol Forecourts	1.0 p.e. each

Community Centre	1.0 p.e. each
Garda Station	1.0 p.e. each

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

Table 3.1 - Existing Development - Ballyduff

Description	No.	p.e.
Existing Domestic	221	640.9
Shops/Supermarkets	7	7
Public Houses	5	15
Post Office	1	1
Commercial Offices	3	3
Hairdressers/Beauty Salon	2	4
Church	1	1
Primary School (Ballyduff Central no. of pupils)	92	18.4
Petrol Forecourts	2	2
Community Centre	1	1
Garda Station	1	1
TOTAL		**694.3**

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 Ballyduff. 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].

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

However, projected growth rates have been calculated based on the residential area available within the Development Boundary for Ballyduff. This Development Boundary was submitted to and approved by the Planning Department of Kerry County Council. Therefore, the projected population growth for Ballyduff is based on the following:

i) High growth rate

Residential development area available within development boundary of 51 hectares. Permitted residential development may only be half of this area due to future rezoning issues which results in an area of 25.5 hectares. This is equivalent to a fixed annual growth rate of approximately 4.92% from the year 2010 once all existing planning applications are constructed. This gives a population of 1,757 in the year 2026.

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 growth rate of approximately 2.46% from the year 2010 once all existing planning applications are constructed. This gives a population of 1,202 in the year 2026.

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 growth rate at 0.83% per annum from the year 2010 once all existing planning applications are constructed. This gives a population of 930 in the year 2026.

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 Ballyduff must also be considered. An additional area of approximately 0.5 Ha has been assumed for institutional development. By determining standard light industry requirements in terms of water consumption, an additional population equivalent of 23 p.e. was calculated.

The addition of this value to the existing commercial p.e 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 Ballyduff can therefore be estimated at 1300 p.e. and this provides sufficient capacity to cater for the medium growth rate of the town.

It should be noted, however, should some significant developments take place in the village for whatever reason, the design populations may need to be revised.

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 around the core main street, and prevent an uncontrolled spread of dispersed housing on the periphery of the village. The Boundary also incorporates areas to the south of the village, which are currently a little isolated from the village, and are not served by public sewer. The determination also allowed for a significant area of green space to be incorporated.

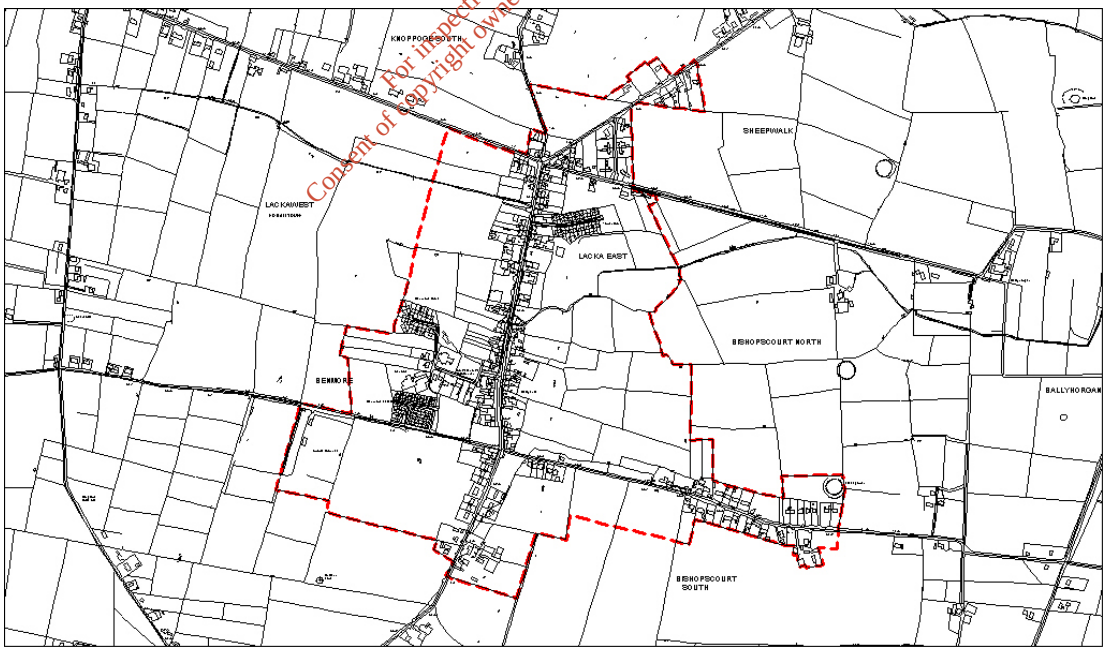

Figure 3-1 - Scheme Boundary

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 public sewerage scheme could make the area more attractive to development. As previously mentioned, small populations centers are very sensitive to expansion by even a small development and therefore, should some significant development take place in the village for whatever reason, the phasing of the scheme would need to be re-examined. Should a significant development take place in the village, then additional treatment capacity may be needed and this capacity should be funded by the aforementioned developer.

3.5 Archaeological Features

There are some archaeological features in Ballyduff, notably 3 ring forts, though only one of these is within the Development Boundary. An archaeological assessment of the scheme is included in Appendix 12.

3.6 Suitable Site Locations

The town was surveyed for suitable site locations, and a suitable site location was identified adjacent to the existing wastewater treatment plant site. As the topography naturally drains to this location, along with the current infrastructure, this location is the obvious choice for an upgraded treatment plant.

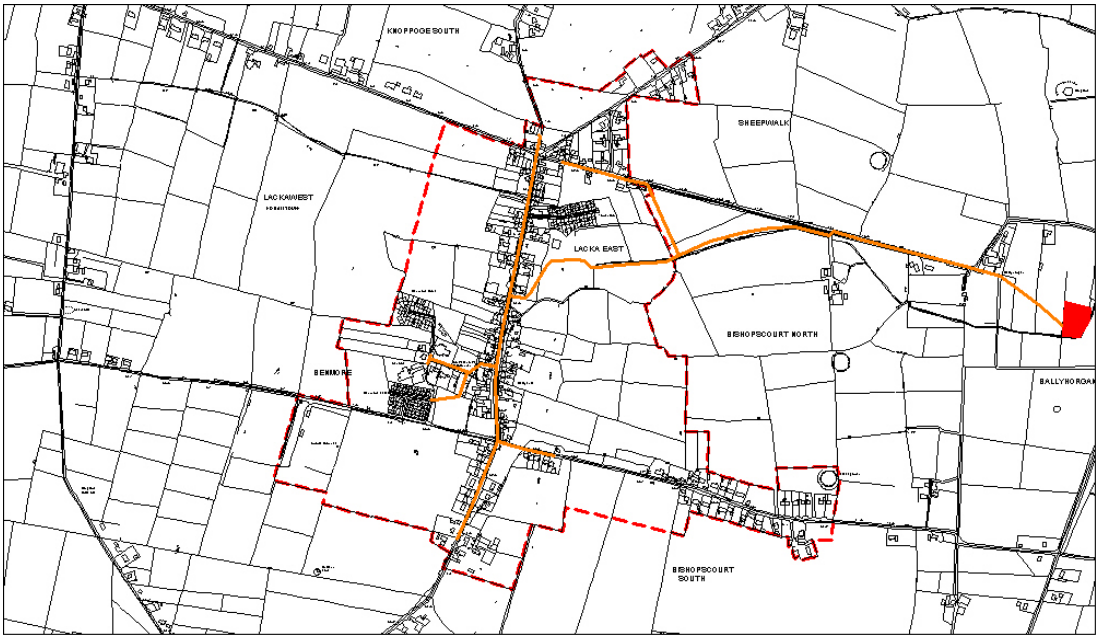

Figure 3-2 - WWTP Site Options

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 Phase I of this scheme;

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

An assessment of the likely Phase II 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 Ballyduff 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-BF-06 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 Ballyduff to maintain the asset and improve the performance of the network.

Table 4.3 – Service Rehabilitation Works in Ballyduff

US Node	Service Grade	Criticality Index	System Type	Pipe Size (mm)	Pipe Length (m)	Comment	Recommended Action
EF 29.2 (8703)	4	2	Combined	225	38	Debris, grease	Pipe cleaning
EF 28 (9801)	4	2	Combined	225	97	Debris, grease, encrustation, connection intruding	Pipe cleaning, repair and "top hat" re-lining
EF 27 (0901)	4	2	Combined	225	40	Debris, silt, grease, encrustation	Pipe cleaning, local repair
EF 6 (0002)	4	2	Combined	225	86	Debris, grease	Pipe cleaning,
EF 1 (3902)	4	2	Combined	225	109	Debris, grease	Pipe cleaning
EF 21 (1001)	4	2	Combined	225	92	Debris, grease, silt	Pipe cleaning

Table 4.4 – Structural Rehabilitation Works in Ballyduff

US Node	Struct-ural Grade	Criticality Index	System Type	Pipe Size (mm)	Pipe Length (m)	Comment	Recommended Action
EF 29 (9701)	4	2	Combined	225	90	Fracture, crack	Cleaning and partial re-lining
EF 30 (9705)	5	2	Combined	150	47	Fracture	Cleaning and partial re-lining
EF 28 (9801)	4	2	Combined	225	97	Fracture, crack	Cleaning and partial re-lining
EF 27 (0901)	5	2	Combined	225	40	Fracture, connection defective	Cleaning, local repair and partial re-lining

4.1.2 Hydraulic Model

The hydraulic model for Ballyduff have 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 models for Ballyduff have 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 except for one storm event where ragging made the verification process difficult. This level of verification is reasonable 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. A summary of the existing hydraulic deficiencies is presented in Table 4.5.

Table 4.5– Hydraulic Deficiencies in Ballyduff

Hydraulic Deficiency No.	US Node ID	Pipe Length (m)	Existing Pipe Size (mm)	Existing Gradient (1/x)	Proposed work
1	EF 9 (8102)	14	225	589	Abandoned due to bend, replaced by manhole r1
	EF 8 (8101)	82	225	258	Upsized pipe to 300mm, new gradient of 1/170
	EF 7 (9001)	91	225	505	Upsized pipe to 300mm, new gradient of 1/180
	EF 6 (0002)	91	225	154	Upsized pipe to 300mm, new gradient of 1/180
	EF 5 (0001)	91.5	225	87	Upsized pipe to 300mm, new gradient of 1/126
	PF 29	33	225	225	Gradient of 1/96
2	EF 28 (9801)	97	225	236	Added a storm tank for storage (190m³). Changed gradients between nodes 87349801 and 87340904 to 1/90
	EF 27 (0901)	40	225	90	
	EF 26 (0903)	5	225	5000	
	EF 25 (0904)	22	225	73	
	EF 24 (0906)	17	225	24	

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 for handling and treatment 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-BF-06.

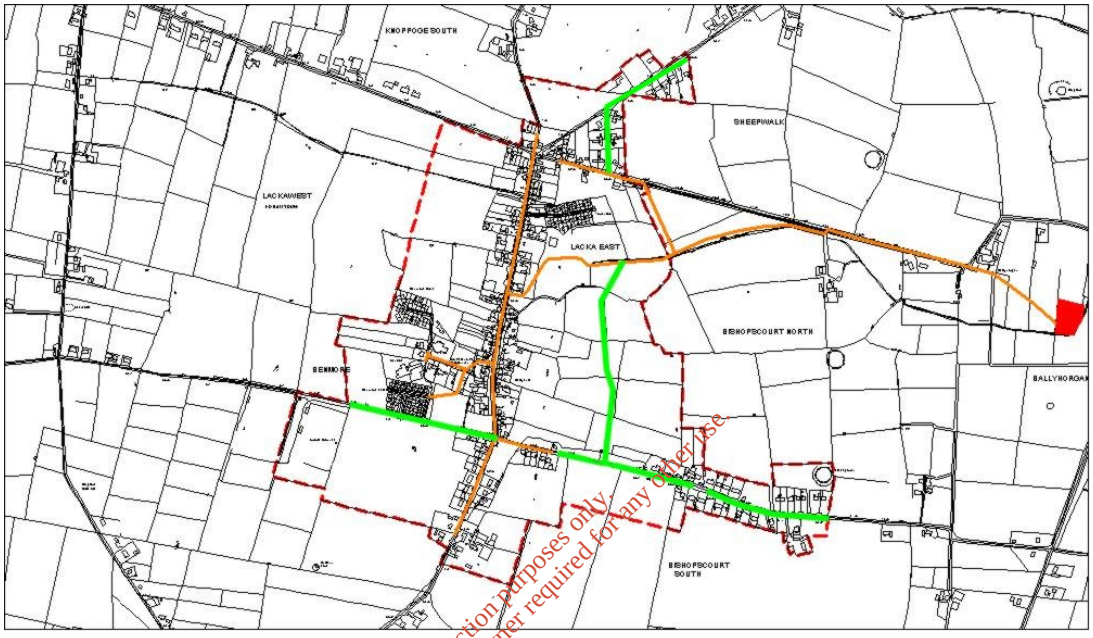

Figure 4-1 - Proposed Network Extensions

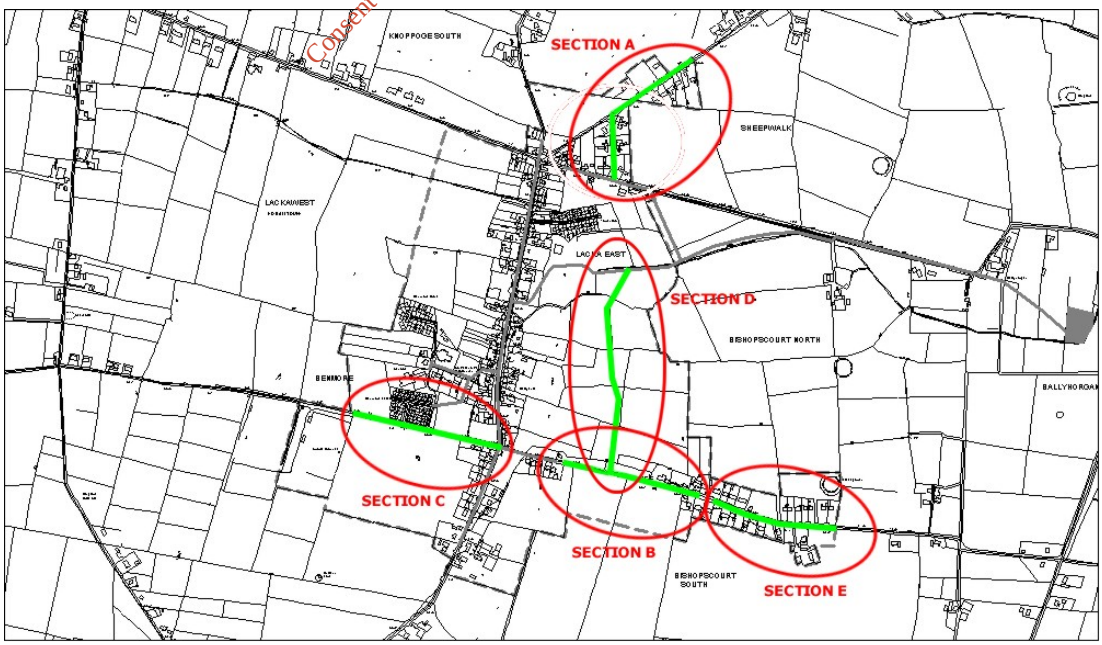

Figure 4-2 - Proposed Network Extension Phases

4.2.1 Ballyduff Phase I Works

The Phase I works will cater for the immediate needs of the village. The extensions are named A to E as illustrated on Figure 4.2.

The areas of zoned land to the north and to the south east of Ballyduff town centre are not drained by the existing sewerage network. The following sewerage extensions are proposed to serve these zoned areas;

SECTION A - Sheepwalk Housing Estate Sewer Extension (Road R551 to Lisseton)

A 225 mm sewer laid at available gradient along the Sheepwalk estate will have adequate capacity to serve the zoned areas to the north of Ballyduff town centre. The existing 150mm diameter sewers serving the Sheepwalk/Lacka East areas should be upsized to 225 mm diameter sewers between manholes EF 14.4 (1201) and EF 14 (4002). A 225mm gravity sewer, with a pumping station at the end, is the most economical way to serve the houses heading north along the Ballybunion Road. The rising main should discharge to manhole PF 3.

SECTION C - Benmore Sewer Extension

A 225 mm sewer, 480 metre long laid at available gradient offered by the topography along the road adjacent to the sports grounds in Benmore would have sufficient capacity to cater for surrounding future developments. The extension would connect to the existing sewer system at manhole EF 32 (9502).

SECTION E - Farranedmond Housing Estate Sewer Extension and Pumping Station (Road to Ballyhorgan Marshes)

It is not possible to transfer flows from the southeastern zoned area to the existing sewerage network by gravity pipeline due to topographic constraints along the route. A 225mm sewer laid at available gradient along the Farranedmond estate will have sufficient capacity to serve the existing 30 houses.

A pumping station and a 750 metre length of 100 mm diameter rising main would be required to transfer flows accumulated by the gravity network to the existing sewerage network in Benmore, at manhole EF 32.5 (1501). The existing 150 mm diameter sewers between manholes EF 35 (8301) and EF 29 (9701) along the

main street should be upsized to 225 mm diameter sewers and connected to the existing sewer network at manhole EF 29 (9701). Upsizing the existing sewer pipes reduces flooding and surcharging as well as eliminates infiltration should there be any.

It is recommended to up size all 150mm trunk main sewers to 225mm, as in the following table:

Manhole References for Sections Requiring upsizing
EF 32.5 (1501) – EF 32 (9502)
EF 29.2.2 (7702) – EF 29.2(8703)
EF 29.1 (9704) – EF 29 (9701)
EF 27.8 (0303) – EF 27.3 (0002)
EF 35 (8301) – EF 29 (9701)

Additionally the deficiencies in table 4.5 should be addressed.

It is recommended that these proposals be carried out as part of the Phase I upgrade and rehabilitation works for Ballyduff Sewerage Scheme.

4.2.2 Ballyduff Phase II Works

The Phase II network extensions open up development land and can be constructed as required by development.

The following sewerage extensions are proposed to serve the areas of zoned land to the East of the town centre to allow for the full development of the catchment.

Section B – Bishopscourt South

204 metres of 225mm diameter sewer laid at available gradient will have adequate capacity to serve properties to the west of Farranedmond Estate. This foul line which travels northwest along the Bishopscourt Road merges with another proposed 225mm foul sewer from the opposite direction. The two sewer lines join at manhole PF 14.

SECTION D - Benmore/Bishopscourt Sewer Extension

530 metres of 225 mm diameter gravity sewer laid at available gradient will have sufficient capacity to cater for new developments between Farranedmond and Lacka East. The proposed sewer would cut across the fields between Benmore and Bishopscourt North and would connect to the existing sewer network at manhole EF 16 (3001). The route shown for this sewer is indicative, as a prospective developer may decide to route the line differently to suit a development.

4.3 Proposed Storm Network

In general, the area within the development boundary slopes downwards towards the east of the town. A local stream was used as discharge points for the surface water. Proposed pipe diameters vary in size from 225mm to 450mm. The proposed storm network layout and long sections for Ballyduff are detailed in Drawing Nos. 20367-BF-13 and 14. Details of the surface water network calculations are shown below.

Area (Ha)	Q_{BAR} (l/s)	Pipe Length (m)	Gradient 1 in ()	Capacity (Colebrook -White) (l\s)	Pipe Diam (mm)	Sewers
0.046	55.492	180	42	73	225	PS1.7-1.5
0.111	122.238	273	61	135	300	PS1.7-1.5
0.053	63.606	272	49	65	225	PS5.11-5.8
0.103	114.786	180	105	173	375	PS5.7.2-5.7
0.161	170.326	146	104	237	450	PS5.7-5.5
0.177	185.252	206	57	380	450	PS5.5-5.1
0.031	39.142	80	121	41	225	PS3.8-3.7
0.078	89.660	176	138	151	375	PS3.7-3.5
0.124	135.532	180	72	209	375	PS3.5-3.3
0.146	156.455	55	40	280	375	PS3.3-3.2
0.164	173.340	60	43	270	375	PS3.2-3.1
0.031	38.905	114	58	60	225	PS2.4+2.1
0.028	35.762	302	20	102	225	PS4.6-4.1

The estimated cost for the proposed stormwater network is €540,479. The detailed breakdown is included in appendix 5.

Any substantial development should have its own surface water drainage system, connected to an individual soak pit as per SUDS, primarily as a method of preventing pollution, as opposed to flooding or watercourse issues. The land drains in the area could be used in conjunction with SUDS as suitable discharge points. This would have the added benefit of diluting the effluent from the treatment plant.

The topography of the village ensures that there should be no risk of flooding to properties. However it is recommended that Kerry County Council develop and enforce a sustainable drainage policy as outlined in Section 2.11. It is also inevitable that a certain amount of surface water could enter the foul network system, particularly from roofs and yards connected to existing septic tanks. Soak pits should be installed by householders to ensure minimum infiltration of storm water into the foul network.

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 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 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.

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.

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 ultimate design p.e for Ballyduff in 2026 is 1300 p.e. as determined by the population projections in Appendix 1 of this report. It is proposed that the works is phased as follows; Phase 1 satisfying medium growth of the village and Phase 2 satisfying high growth of the village, should this situation occur.

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

Table 5.1 – Ballyduff Influent Load

Parameter	Phase 1	Phase 2
Population Equivalent	1300	1950
Dry Weather flow (l/s)	3.39	5.08
Average BOD (kg/day)	78.00	117.00
Total Phosphorus (kg/day)	2.34	3.51
Total Nitrogen	14.30	21.45
Suspended Solids	91.00	136.50

5.3 Discharge Standards

The primary objective in setting an effluent quality standard for Ballyduff 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

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".

In this context "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".

The Cashen Estuary is designated as sensitive under the Third Schedule, however, under article 4.4(b) nutrient reduction is not required if the sanitary authority is satisfied that such reduction will have no effect on the level of eutrophication in the receiving waters.

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.

5.3.3 *Quality of Salmonid Waters*

The Cashen/Feale Estuary has been included in Schedule 1 of the European Communities (Quality of Salmonid Waters) Regulations, S.I. 293/88 and is therefore designated as a salmonid water. 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

For the purposes of the calculation of the assimilative capacity, the receiving waters have been taken as the Cashen/Feale River on the basis that this is the

first aquatic ecosystem that the effluent enters. Prior to entering the river, the effluent is currently discharged to a land drain, the only purpose of which is to evacuate surplus rainfall runoff.

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.

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 4mg 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

Under the UWWT Regulations (2001), the Cashen Estuary, downstream of Poulnahaha Old Railway to Cashen, has been designated a sensitive area under the Third Schedule of the Regulations. The ultimate population of Ballyduff however is less than 10,000, so as a result no Total Nitrogen (and thus no Total Oxidised Nitrogen) standard applies.

Total Ammonia

The effluent total Ammonia concentration permitted is calculated using the maximum permitted downstream concentration of 1mg/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 0.02mg/l, can harm fish.

5.4.2 *Aspects of River Catchment Hydrology*

The nearest hydrometric station to Ballyduff is at Listowel (Grid Reference N 997 333) for the Feale River catchment. This station has been in operation since 1946. The reported catchments characteristics at Listowel based on the period of digitised record (1946-2006) and published by the OPW are given below:

Catchment Area	646 km^2
95 Percentile Flow	1.41 m^3/sec
Average Annual Flow	20.823 m^3/sec

The Catchment Area at the WWTP has been estimated to be 750 km^2. Extrapolating from the catchment characteristics for the Feale River, the calculated catchment characteristics for the discharge location are given below.

Catchment Area	750 km^2
95 Percentile Flow	1.637 m^3/sec
Average Annual Flow	24.787 m^3/sec

5.4.3 Water Quality

Relevant Biological Water Quality Data for the Feale River is given in the Table 5.4 below. The nearest upstream station is the Railway Bridge upstream of Ferry Bridge (0860) but this station is not rated by the EPA. The station at Finuge Bridge (0800) is however rated by the EPA and is approximately 10km from the proposed discharge point. The closest downstream station from the discharge location is at Ferry Bridge (0900) but this station is currently unrated by the EPA. The sampling locations are illustrated in Figure 5-1

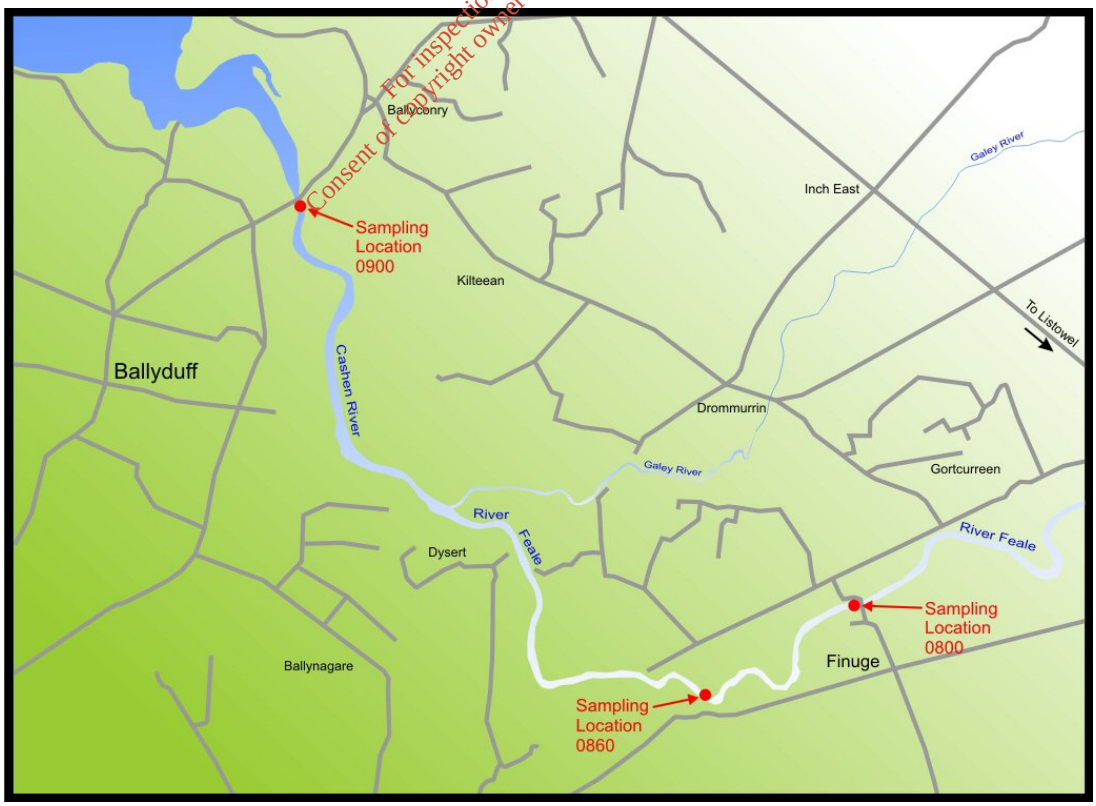

Figure 5-1 - EPA Sampling locations

Table 5.4 – Water Quality (Q) Data (EPA) for the Feale River 1971 -2002 (STN0800)

	Biological Quality Rating Q Value									
Year	**1971**	**1975**	**1979**	**1982**	**1984**	**1986**	**1991**	**1996**	**1998**	**2001**
Upstream	4-5	**3-4**	**3**	**2-3**	**2-3**	**2**	**3**	**3**	**3**	**3-4**
Downstream	-	-	-	-	-	-	-	-	-	-

Table 5.5 – Assumed Upstream Water Quality and actual Chemical Analysis (EPA) 2001 - 2003 for Feale River at Upstream (0860) and Downsteam (0900) Locations

Parameter	**Dissolved Oxygen (% Saturation)**			**BOD (mg/l O_2)**		
Station	**Min.**	**Med.**	**Max.**	**Min.**	**Med.**	**Max.**
Upstream	**68**	99	120	1.0	1.8	**7.1**
Downstream	79	95	**132**	1.0	2.0	**8.3**

Parameter	**Total Ammonia (mg/l N)**			**Ortho-Phosphate (mg/l O_2)**		
Station	**Min.**	**Med.**	**Max.**	**Min.**	**Med.**	**Max.**
Upstream	<0.04	0.03	0.22	<0.01	**0.04**	**0.25**
Downstream	<0.02	0.06	**0.32**	<0.01	**0.04**	**0.13**

The Feale river upstream of Ballyduff is currently classified as being moderately polluted. The EPA's assessment of the Feale River was that it was slightly polluted in and downstream of Listowel with a slight improvement recorded at Finuge Bridge.

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 1.8 mg/l. The resultant WAC calc gives an allowable effluent concentration of approx 1,068 mg/l.

Phosphorus

The minimum target ratings and concentrations for these stretches of water as defined in the Phosphorus Regulations are given in the table below:

Phosphorus Regulations Target Ratings and Concentrations

	1996 Biological Quality (Q) Rating/Q Index	Minimum Target Biological Quality (Q) Rating /Q Index	Median Concentration (μg MRP/L)
Upstream	3	3-4	45
Downstream	Unrated	Unrated	Unrated

The upstream water quality must improve to a Q3-4 rating (i.e. 45 μg MRP/l). The current downstream chemical analysis shows that the water quality at Ferry Bridge for orthophosphate has a value of 40 μg MRP/l. Therefore the allowable increase in the receiving water is taken as 5μg MRP/l.

Using the WAC calculation and Average Flow this gives an allowable effluent standard of 55.00 mg MRP/l.

Total Ammonia

From analysis of the sampling results presented the background value for Total Ammonia is taken as 0.03 mg/l. The resultant WAC calculation gives an effluent concentration of approx 470.4 mg/l.

A summary of the allowable effluent concentrations is shown in Table 5.7.

Table 5.7 –Allowable Effluent Concentrations

Parameter	Allowable Effluent Concentrations (mg/l)
BOD	1,068
Phosphorus	55
Ammonia	470

Given the very high allowable effluent concentrations, it is considered that the level of eutrophication in the receiving waters is not affected by the level of nutrient removal in Ballyduff WWTP, and therefore nutrient removal is not necessary.

5.5 Discharge Specification

BOD

The concentration of raw influent to the Ballyduff treatment plant should be in the range 95 – 300 mg/l. The Feale/Cashen River has the waste assimilative capacity to deal with multiples of this figure. However, as the Phase II population is approaching 2000 p.e., secondary treatment would deemed necessary at Ballyduff at that stage. It is therefore proposed to have a limited Phase I effluent BOD standard, but to adopt a full effluent BOD standard of 25 mg/l for Phase II.

Phosphorus

The concentration of Phosphorus in the raw influent should be at most 11 mg/l based on current domestic loadings. Typical effluent from a secondary treatment plant will return a concentration of 8 mg/l or less. Given that the Feale/Cashen can take many multiples of this, it is not proposed to have a standard for Phosphorus for Phase I. However, as the receiving water is classified as sensitive, consideration should be given to adopt an effluent standard of 2 mg/l for Phase II.

Total Ammonia

The concentration of Nitrogen in the raw effluent should be in the range 40 – 50 mg/l. As stated previously, the Feale/Cashen River has the waste assimilative capacity to deal with multiples of this figure and therefore, no ammonia standard is proposed.

Table 5.7 –Discharge Specification

Parameter	Phase I	Phase II
	Discharge Specification (mg/l)	Discharge Specification (mg/l)
BOD	100	25.0
Phosphorus	15	2.0
Total Nitrogen	n/a	n/a

5.5.1 Required Treatment

The wastewater collected at Ballyduff consists of primarily domestic wastewater, which will need screening and treatment. It is proposed to treat the wastewater at Ballyduff using a CAST system (Compartmentalised Aerated Septic Tank). This 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 of the Cashen River at the discharge location. The assimilative capacity at this location is very large and indicates that minimal removal of pollutants is required on environmental grounds.

The CAST 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 secondary treatment system, downstream of the CAST tanks.

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.

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.

The CAST system can either be a single tank, or alternatively a series of tanks. In the case of Ballyduff, it is proposed to use a series of prefabricated septic tanks, with additional de-gasification chamber, downstream. This would be more economical than a single cast in-situ tank. The arrangement chosen is a single tank ($^1/_3$ of total required volume) upstream of two tanks in parallel ($^2/_3$ of total required volume).

In practice this will mean that the full volume is available under normal dry weather flow conditions, with the first tank catching the majority of the solids. Under storm conditions, however, flow through the first tank will be capped, and flows in excess will go directly to the two downstream tanks. This arrangement will aid maximum capture of the "first flush" due to a storm event and ensure minimum wash out of solids from the tanks.

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. The effluent from the CAST system can discharge to a land drain which is currently located to the east of Ballyduff. This land drain flows into the Cashen River which is designated as a sensitive water under the Urban Wastewater Treatment Regulations. The land drain is not an aquatic ecosystem, and therefore the Cashen has been taken as the receiving water. The land drain itself is 940m long and the oxygen rich effluent from the CAST system will receive further polishing along the drain before reaching the Cashen River.

5.6 Wastewater Treatment Plant Site

The proposed treatment plant site is adjacent to the existing wastewater treatment plant, to the East of the village, some 1500m away from its center. The nearest housing is 130m away. The current treatment plant is an uncovered coarse screen and Imhoff tank. The proposed site is 3,120 m^2, in addition to the existing site.

5.7 Outfall

In terms of potential outfall locations, there are two options, which will be examined. These are:

1. Use existing outfall arrangement (Land drain)
2. Construct new outfall to Cashen River

A discharge to the adjacent land drain would be beneficial in terms of the polishing of the effluent as it travels down the drain vis avis the current situation to the Cashen River. There would be an improvement in the water quality in the

land drain insofar as the effluent would be oxygenated and de-gassified, and therefore virtually odourless, and capable of supporting aquatic life. The land drain is a relatively inaccessible artificial channel, and not a natural water ecosystem and therefore full environmental concerns are only applicable to the Cashen River.

Alternatively the construction of a new outfall from the treatment plant would allow the effluent to be kept isolated until it reached the Cashen River. This outfall would be 940m long, and would not offer any further treatment to the effluent. The cost of this would be substantial, and is detailed in the cost estimates section.

As such, the discharge to the land drain, as per the existing arrangement, is the preferred discharge method. In order to maintain full control of the land drain, and ensure its appropriate upkeep, it is recommended that Kerry County Council purchase the land drain. This cost has been included for in the scheme cost using the land cost figures provided by Kerry County Council.

5.8 Sludge

The sludge quantities produced at Ballyduff will undergo fermentation and volume reduction in the septic tank. Published data rates of sludge accumulation in a septic tanks 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 specifies that over a 1 year period, 60 gallons (227 l) of sludge is generated per capita. This equates to 295m^3 of sludge per year for Ballyduff at 1300 p.e. The total volume of the proposed CAST system at that stage is 247 m^3. Therefore dislodging of the septic tank would need to take place once 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.

6.0 PROJECT PHASING, COSTS AND PROCUREMENT

6.1 Project Phasing

For the treatment plant, it is recommended to add the required infrastructure for Phase I at this stage (to 1300 p.e.). Should the population equivalent reach 1850 p.e. on the influent to the plant, then provisions should be made for the addition of a form of secondary treatment, however, it is envisaged that this will occur after the lifespan of this Report.

The CAST treatment plant will essentially operate to a similar degree of treatment efficiency, despite being under loaded, in terms of settleable particulate matter which will remain in the septic tank, whereas soluble material will pass through. 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 residence time within the aeration chamber which is of primary importance.

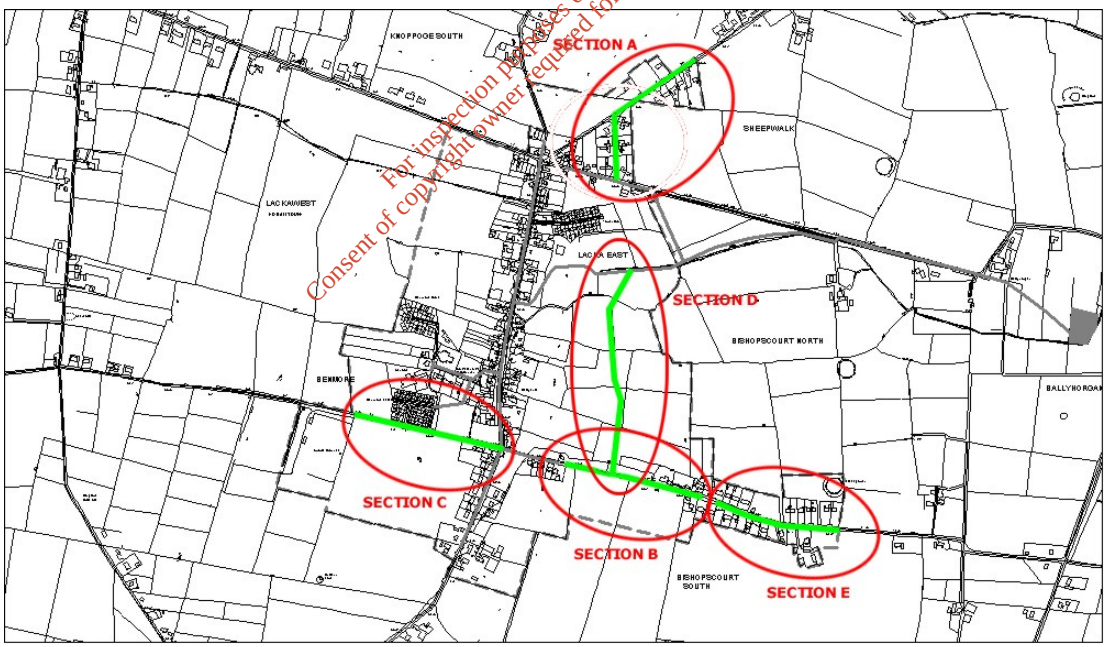

Figure 6-1 - Network Phasing Options

For the network, it is recommended to construct Phase I now (Sections A, C and E), and Phase II (Section B and D) are constructed as required to service the land to the east of the village. The various sections are illustrated in Figure 6.1. The wastewater collection network would be installed to serve the existing dwellings,

and future dwellings can connect into these lines new lines and other existing lines to fully service the Development Boundary.

6.2 Capital Costs

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

Capital Costs	
WwTP	€849,954.15
Network Upgrades & Repairs	€707,238.08
Network Extensions (Phase I - A, E & C)	€642,165.98
Total	**€2,199,358.21**

This allows for the following:

Collection Sewer

- New Trunk Mains
- Network Upgrades to 225mm
- Rising Main & Pump Stations
- Repairs

WWTP

- Land Costs
- Septic Tanks
- Venturi Aerator & Degasification Chamber & UV disinfection
- Access Road
- Low Level fencing

6.3 Scheme Operation and Maintenance Costs

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

Operating Costs	
WwTP	€1,342.95
Network	€1,349.91
Total	**€2,692.87**
NPV Total	**€33,391.58**

This allows for the following:

Network Sewer

- Pump operation

WWTP

- Venturi Aerator
- Desludging
- Transport Costs

The whole life cost of this scheme is **€2,232,750** or **€9,666** 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 6.2 illustrates the possible 'need' for a given project and the subsequent actions required to open particular funding avenues.

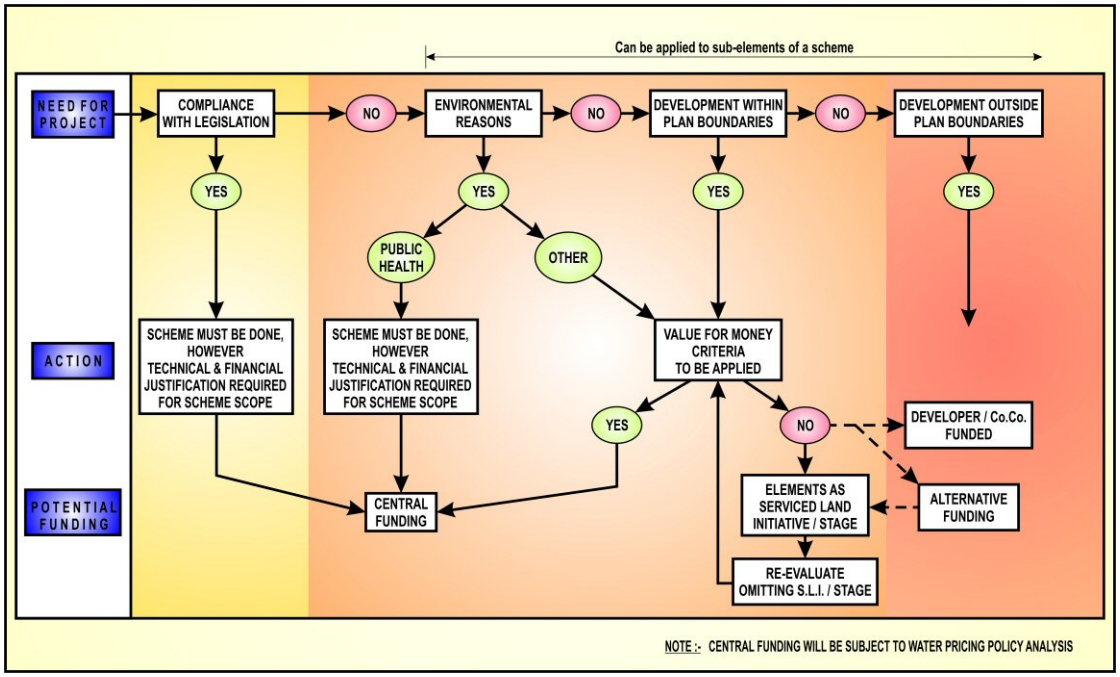

Figure 6-2 - Need for Project Schematic

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 recognized. 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.

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. In the case of a CAST system for local treatment, however, the savings on operational efficiency would be small, but a DBO contractor may propose an alternative system.

6.5.3 *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 **€9,666** 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.

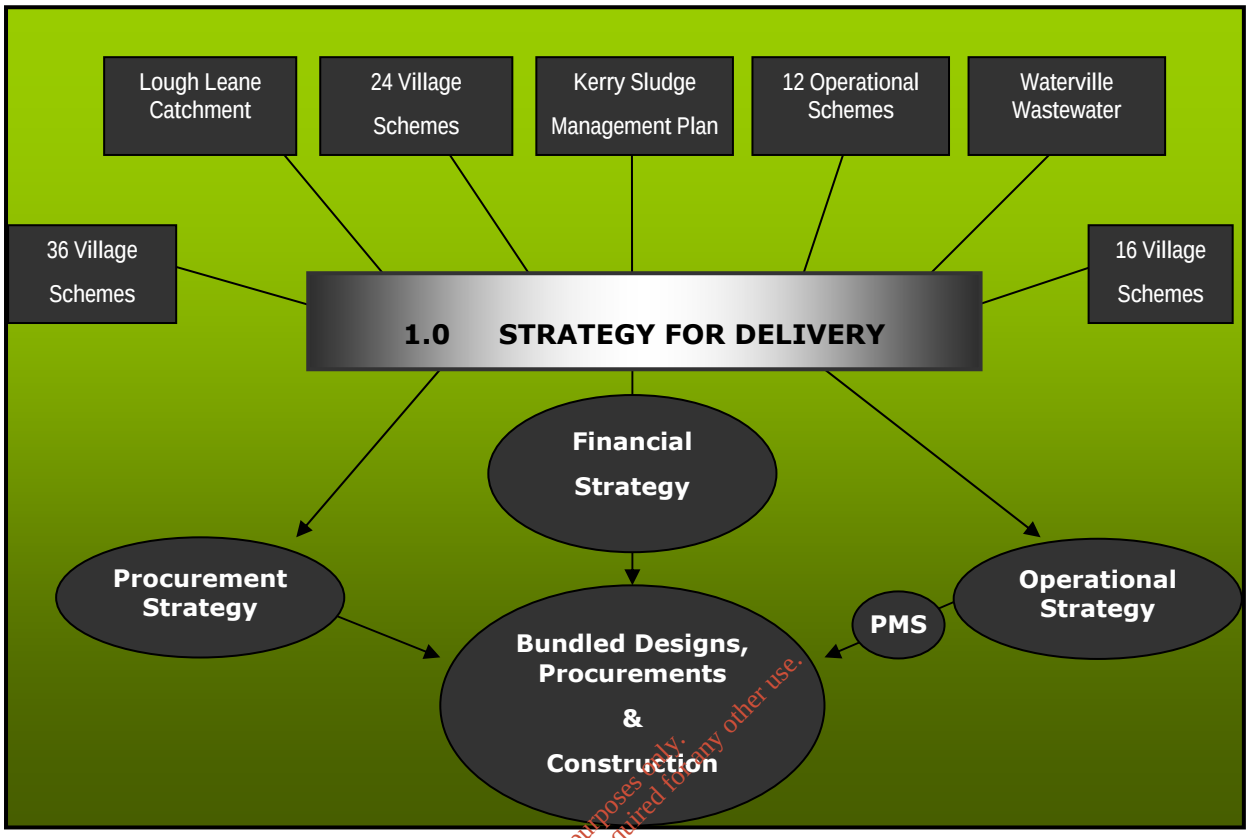

Figure 6-3 - County Kerry Wastewater & Sludge Project - Strategy for Delivery

Due to the urgent need for an effective wastewater infrastructure in Ballyduff 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 Ballyduff 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 collection on option treatment applicable to Ballyduff. 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 694 PE
- The 2026 PE is estimated at 1,300 PE
- The Capital Cost of the Scheme is €2,199,358 (inc VAT)
- The Capital Cost per existing PE is €3,169
- The Capital Cost per existing house is €9,521
- The Capital Cost per hectare land serviced is €66,146
- The most appropriate receiving water is a local land drain.
- The required minimum effluent standards are: 100mg BOD/l, 15mg TP/l
- The existing area is 15.43 ha.
- The Phase 1 area is 17.82 ha
- The Capital Cost of the proposed Storm Network is €567,985.

7.2 Recommendations

The following recommendations are proposed for Ballyduff Sewerage Scheme:

- Ballyduff 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.

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			

Ballyduff Population Estimate

From Geodirectory

Residential Houses	221
Shops/Supermarkets	7
Public Houses	5
Post Office	1
Commercial Offices	3
Hairdressers/Beauty Salon	2
Church	1
Primary School (Ballyduff Central)	1
Petrol Forecourts	2
Community Centre	1
Garda Station	1

Ballyduff Planning Permissions

Reference No.	Description
033684	1 house
033824	26 houses
033876	3 houses
041531	1 house
041533	1 house
042185	1 house
042190	1 house
043634	2 houses
043905	12 houses
051367	2 houses
053873	10 houses

Planning Residental	60
Under Construction	0
Planning	60
Shop	0
Parish Hall	0

Exisiting Population Assessment

	No.	P.E./per	P.E.
Residential Houses	221	2.9	640.9
Shops/Supermarkets	7	1	7
Public Houses	5	3	15
Post Office	1	1	1
Commercial Offices	3	1	3
Hairdressers/Beauty Salon	2	2	4
Church	1	1	1
Primary School (Ballyduff Central)	92	0.2	18.4
Petrol Forecourts	2	1	2
Community Centre	1	1	1
Garda Station	1	1	1
Existing PE			694.3
Residential Under Construction	0	2.9	0
Commercial Under Construction	0	1	0
Total PE			694.3
Residential Planning Permissions	60	2.9	174
Amenity Planning Permissions	0	1	0
Future PE			868.3

Determination of Domestic Growth Rates

Residential Development Area Available	51.32	Ha
Permitted Residential Devlopment - Future (Rezoning)	25.66	Ha
Site area allocated per house	0.067	Ha
No. of houses that could be built in future	385	Houses
Additional PE in Residential Zoned Area	1116.5	P.E.
Existing Domestic Population	640.9	P.E.
Total Domestic Population 2026	1757.4	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	0.51	Ha
Water Consumption per Hectare per day	10	m3/hectare/day
Water Consumption per day	5.1	m3/day
Equivalent Commercial/Institutional PE	23	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	4.92%
Medium	2.46%
Low	0.83%

Year	Domestic PE	High Growth Rate	Domestic PE	Medium Growth Rate	Domestic PE	Low Growth Rate
1966	382.00		382.00		382.00	
1971	406.00		406.00		406.00	
1979	445.00		445.00		445.00	
1981	499.00		499.00		499.00	
1986	751.00		751.00		751.00	
1991	670.00		670.00		670.00	
1996	649.00		649.00		649.00	
2002	614.00		614.00		614.00	
2006	640.90		640.90		640.90	
2007	684.40		684.40		684.40	
2008	727.90		727.90		727.90	
2009	771.40		771.40		771.40	
2010	814.90		814.90		814.90	
2011	855.00	4.92%	834.95	2.46%	821.66	0.83%
2012	897.07	4.92%	855.49	2.46%	828.48	0.83%
2013	941.21	4.92%	876.54	2.46%	835.36	0.83%
2014	987.52	4.92%	898.10	2.46%	842.29	0.83%
2015	1036.11	4.92%	920.20	2.46%	849.28	0.83%
2016	1087.09	4.92%	942.84	2.46%	856.33	0.83%
2017	1140.58	4.92%	966.03	2.46%	863.44	0.83%
2018	1196.71	4.92%	989.80	2.46%	870.61	0.83%
2019	1255.59	4.92%	1014.15	2.46%	877.83	0.83%
2020	1317.37	4.92%	1039.10	2.46%	885.12	0.83%
2021	1382.19	4.92%	1064.67	2.46%	892.47	0.83%
2022	1450.20	4.92%	1090.86	2.46%	899.87	0.83%
2023	1521.56	4.92%	1117.70	2.46%	907.34	0.83%
2024	1596.43	4.92%	1145.20	2.46%	914.87	0.83%
2025	1674.98	4.92%	1173.37	2.46%	922.47	0.83%
2026	1757.40	4.92%	1202.24	2.46%	930.12	0.83%

Year	Commercial / Inst. PE	Fixed Growth Rate
2006	53.4	
2007	54.36	1.81%
2008	55.35	1.81%
2009	56.35	1.81%
2010	57.37	1.81%
2011	58.40	1.81%
2012	59.46	1.81%
2013	60.53	1.81%
2014	61.63	1.81%
2015	62.74	1.81%
2016	63.87	1.81%
2017	65.03	1.81%
2018	66.20	1.81%
2019	67.40	1.81%
2020	68.62	1.81%
2021	69.86	1.81%
2022	71.12	1.81%
2023	72.40	1.81%
2024	73.71	1.81%
2025	75.04	1.81%
2026	76.40	1.81%

Year	Total Population Estimate		
	High Estimate	Medium Estimate	Low Estimate
2006	694.30	694.30	694.30
2007	738.76	738.76	738.76
2008	783.25	783.25	783.25
2009	827.75	827.75	827.75
2010	872.27	872.27	872.27
2011	913.40	893.35	880.07
2012	956.52	914.95	887.94
2013	1001.74	937.07	895.89
2014	1049.15	959.73	903.92
2015	1098.85	982.94	912.02
2016	1150.97	1006.71	920.21
2017	1205.61	1031.06	928.47
2018	1262.91	1056.00	936.81
2019	1322.99	1081.55	945.23
2020	1385.99	1107.72	953.74
2021	1452.05	1134.52	962.32
2022	1521.32	1161.98	970.99
2023	1593.96	1190.10	979.75
2024	1670.14	1218.91	988.58
2025	1750.03	1248.42	997.51
2026	1833.80	1278.64	1006.52

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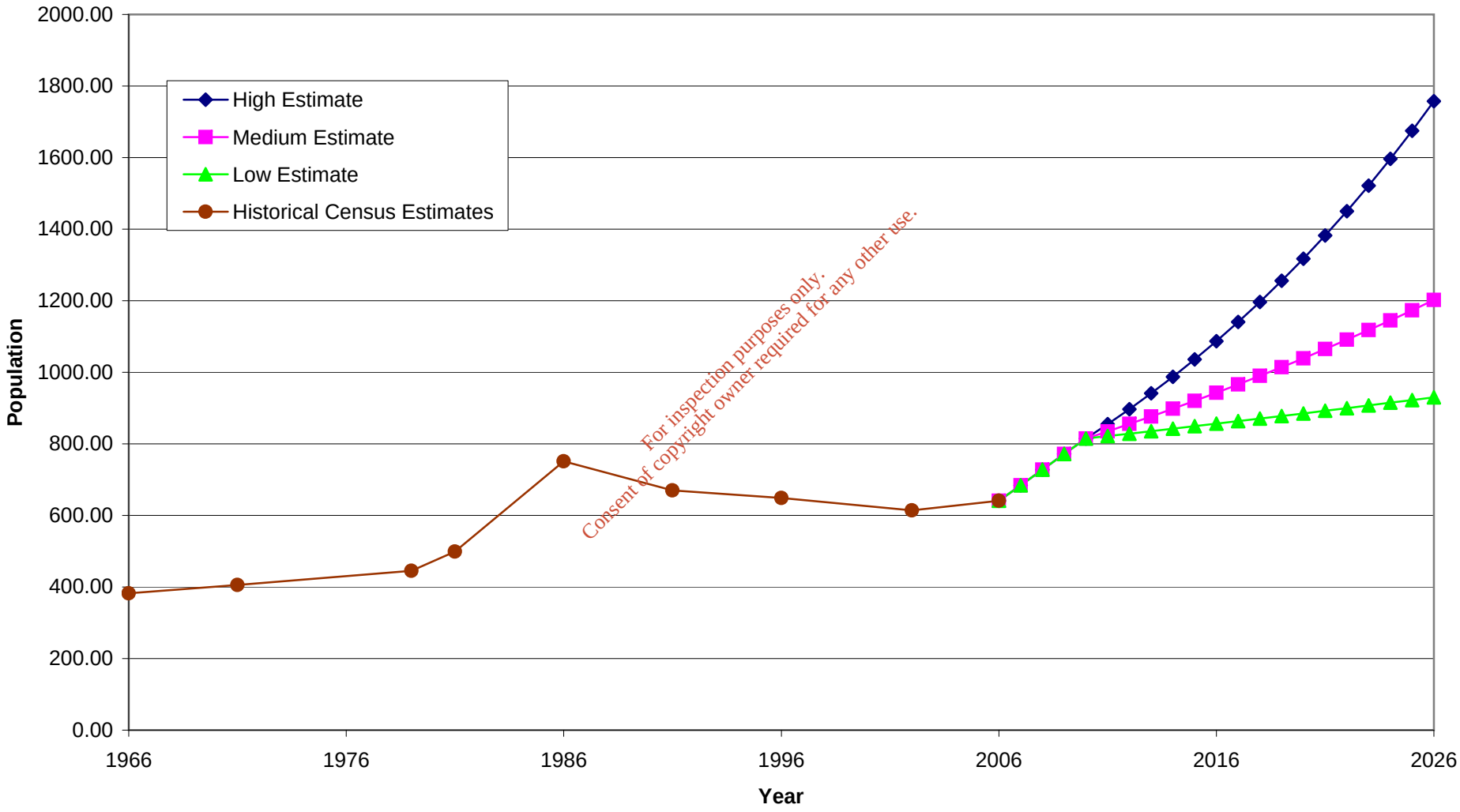
Ballyduff Domestic Population Estimates



APPENDIX 2

Design Assessment of Existing Scheme

Existing Network

Ballyduff is served by an existing combined gravity system. The system drains to a Wastewater Treatment Works (screening and Imhoff tank) located approximately 1,500 m to the east of the village.

The network has been altered by developers in certain locations from that given in the brief and the Caretaker has reported problems with choking and flooding in the system. Some manholes are covered due to road resurfacing.

The Caretaker has also reported changes in diameter from 225mm to 150mm in the system.

Existing Wastewater Treatment Plant

The plant is located in a relatively isolated location. The treatment plant consists of manually raked coarse screening (Photo 2.1) followed by primary treatment through an Imhoff tank (Photo 2.2).

The effluent from the plant discharges via outfall to a land drain that in turn discharges to the Cashen River (Photo 2.4). The plant is reported to be overloaded and suffers from excessive grease volumes. Screenings pass through the plant and onto the receiving water (Photo 2.3).

Photo 2.1 Inlet Screening

Photo 2.2 Imhoff Tank

Photo 2.3 WWTP Effluent

Photo 2.4 Land Drain to Cashen River

APPENDIX 3

Design of Proposed Collection Network and Pumping Stations

Wastewater Collection Network

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-BF-06.

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.

APPENDIX 4

Design of Proposed Treatment Process

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballyduff/Kerry	*1.1*	*29-Aug-06*	*M. Davitt*
Sheet:	1 of 1			

CAST Design Calculation Sheet

Population Equivalent	1300	
Water Consumption	200	l/h/d
Design DWF	260,000	l/d
Peak Flow	542	l/min
Septic Tank Volume	236,000	l
Main Volume	157,333	l
Secondary Volume	78,667	l
Aeration Retention Time	20	min
Aerated Volume	10833	l
	10.83	m³
Total CAST Volume	246,833	l
	247	m³
Total Retention Time	23	hours
CAST Size (Single Tank)		
Depth	3000	mm
Plan Area	82.28	m²
L/W Ratio	2	
Width	6.41	m
Length	12.83	m
Aerated Plan Area	3.61	m²
Width and Length	1.90	m
Alternatively use 3 PreFabricated Tanks		
Depth	3.00	m
Width	4.00	m
Length	8.00	m
Total Septic Volume	288.00	m³
Post Aeration		
Inlet O2	0	mg/l
Outlet O2	10	mg/l
Mass O2	0.11	kg
Transfer	0.33	kgO2/h
Transfer Rate	1.15	kg O2/kW.h
Aerator Required	0.28	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	1300
Q 4-5 Ortho P Limit	0.02 mg/l	Phase 2 PE	1950
Q4 Ortho P Limit	0.03 mg/l		
Q3-4 Ortho P Limit	0.045 mg/l	Q3 rating 1996	Railway Bridge u/s Ferry Bridge
Q3 Ortho P Limit	0.07 mg/l		

Ballyduff 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	292.5	1.8	4	141437	1067.80	312.33
Phase 1 - 3DWF	877.5	1.8	4	141437	358.60	314.67
Phase 1 - 6DWF	1755	1.8	4	141437	181.30	318.18
Phase 2 - 1DWF	438.75	1.8	4	141437	713.20	312.92
Phase 2 - 3DWF	1316.25	1.8	4	141437	240.40	316.43
Phase 2 - 6DWF	2700	1.8	4	141437	119.24	321.96

	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	292.5	0.04	0.045	2088746.75	55.00	16.09
Phase 1 - 3DWF	877.5	0.04	0.045	2088746.75	18.38	16.13
Phase 1 - 6DWF	1755	0.04	0.045	2088746.75	9.22	16.19
Phase 2 - 1DWF	438.75	0.04	0.045	2088746.75	36.69	16.10
Phase 2 - 3DWF	1316.25	0.04	0.045	2088746.75	12.28	16.16
Phase 2 - 6DWF	2700	0.04	0.045	2088746.75	6.02	16.25

	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	292.5	0.03	1	141437	470.04	137.49
Phase 1 - 3DWF	877.5	0.03	1	141437	157.35	138.07
Phase 1 - 6DWF	1755	0.03	1	141437	79.17	138.95
Phase 2 - 1DWF	438.75	0.03	1	141437	313.69	137.63
Phase 2 - 3DWF	1316.25	0.03	1	141437	105.23	138.51
Phase 2 - 6DWF	2700	0.03	1	141437	51.81	139.89

	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	292.5	10	25	141437	7278.16	2128.86
Phase 1 - 3DWF	877.5	10	25	141437	2442.72	2143.49
Phase 1 - 6DWF	1755	10	25	141437	1233.86	2165.42
Phase 2 - 1DWF	438.75	10	25	141437	4860.44	2132.52
Phase 2 - 3DWF	1316.25	10	25	141437	1636.81	2154.45
Phase 2 - 6DWF	2700	10	25	141437	810.76	2189.05

APPENDIX 5

Cost Estimates

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	1 of 9			

Financial Summary Sheet

Capital Costs

WwTP	€849,954.15
Network Upgrades & Repairs	€707,238.08
Network Extensions (Phase I - A, E & C)	€642,165.98
Total	**€2,199,358.21**

Operating Costs

WwTP	€1,342.95
Network	€1,349.91
Total	**€2,692.87**
NPV Total	**€33,391.58**

Scheme Whole Life Costs **€2,232,749.79**

	No Houses	Cost Per House
Network Whole Life Cost Per Newly Connected House	36	€17,875.44
Treatment Plant Whole Life Cost Per House (Incl Network Upgrades	195	€7,985.60
Whole Scheme Costs per connected House	**231**	**€9,665.58**

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

Phased Elements

Network Capital Costs (Phase 2)

Section B	€130,845.64
Section D	€101,765.63

Cost Comparisons

Existing PE	694
2026 Design PE	1,300
Capital Cost	€2,199,358.21
Capital Cost per Existing PE	€3,169.10
Capital Cost per existing house	€9,521.03
Capital Cost per ha land serviced	€66,146.11
Phase 1 Area (ha)	17.82
Existing Area (ha)	15.43

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	2 of 9			

Operational Cost Calculation Sheet

Network	No	Unit	Power kW	Quantity	Unit	Rate, €	Total, €
Pumping	2	Item	0.18	2920	h	0.11	€115.63
Service	2	Item		1	No	500.00	€1,000.00
						Total	**€1,115.63**
						VAT @ 21%	€234.28
						Network Total	**€1,349.91**

WWTP	No	Unit	Power kW	Quantity	Unit	Rate, €	Total, €
Venturi Power	1	Item	0.3	8760	h	0.11	€289.08
Desluding & Transport	10	km		2	No	410.40	€820.80
						Total	**€1,109.88**
						VAT @ 21%	€233.07
						WWTP Total	**€1,342.95**
						Combined Total (Network & WwTP)	**€2,692.87**
						NPV of combined total	**€33,391.58**

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	3 of 9			

BoQ Treatment Plant Calculation Sheet

Treatment Civil Works	Unit	Quantity	Rate, €	Total, €
Site Clearence	m^2	3,120	1.00	3,120
CAST Tank	cu.m.	247	300	74,100
Outfall pipe within site	m	24	75	1,800
Manholes	no	3	1,500	4,500
Pipework between units	m	42	50	2,100
Valves and fittings	no	11	750	8,250
UV Disinfection	item	4	5,500	22,000
Ducting	m	42	15	630
Internal roadway	m^2	258	40	10,320
Fencing access road (post and rail)	m	220	40	8,800
75mm water supply	m		40	0
3 phase power supply	item	1	15,000	15,000
Sub total Treatment Civil Works				**156,860**
Add Prelims and Contengencies @ 20%				31,372
Add Site Investigation @ 5%				7,843
Sub total excl VAT				**196,075**
Add VAT @ 13.5%				26,470
Sub total incl VAT				**222,545**
Add Land Acquisition	h.a.	0.31	200,000	62,400
Add Land Acquisition of Land Drain	h.a.	2.60	200,000	520,500
Overheads/Fees/Site Supervision @ 20%				44,509
Total Cost of Treatment Civil Works				**849,954**

Treatment Civil Works	Unit	Quantity	Rate, €	Total, €
Outfall pipe to Cashen River	m	940	750	705,000

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	4 of 9			

BoQ Pipeline Calculation Sheet

Section A

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in roads	m	418	85	35,530
50mm Rising Main in Common Trench	m	241	35	8,435
Manholes	no	4	1,500	6,000
Service connections	no	17	600	10,200
Temporary Road Reinstatement	m^2	502	35	17,570
Permanent Road reinstatement	m^2	502	50	25,100
Pumping Station	item	1	30,000	30,000
Sub total Collection System				**132,835**
Add Prelims and Contengencies @ 20%				26,567
Add Site Investigation @ 5%				6,642
Sub total excl VAT				**166,044**
Add VAT @ 13.5%				22,416
Sub total incl VAT				**188,460**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				37,692
Total Collection Network				**226,152**

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:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	5 of 9			

BoQ Pipeline Calculation Sheet
Section B

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in roads	m	347	85	29,495
Manholes	no	6	1,500	9,000
Service connections	no	5	600	3,000
Temporary Road Reinstatement	m^2	416	35	14,560
Permanent Road reinstatement	m^2	416	50	20,800
Sub total Collection System				**76,855**
Add Prelims and Contengencies @ 20%				15,371
Add Site Investigation @ 5%				3,843
Sub total excl VAT				**96,069**
Add VAT @ 13.5%				12,969
Sub total incl VAT				**109,038**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				21,808
Total Collection Network				**130,846**

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:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	6 of 9			

BoQ Pipeline Calculation Sheet
Section C

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in roads	m	390	85	33,150
Manholes	no	6	1,500	9,000
Temporary Road Reinstatement	m^2	468	35	16,380
Permanent Road reinstatement	m^2	468	50	23,400
Sub total Collection System				**81,930**
Add Prelims and Contengencies @ 20%				16,386
Add Site Investigation @ 5%				4,097
Sub total excl VAT				**102,413**
Add VAT @ 13.5%				13,826
Sub total incl VAT				**116,238**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				23,248
Total Collection Network				**139,486**

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:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	7 of 9			

BoQ Pipeline Calculation Sheet
Section D

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in fields	m	600	70	42,000
Manholes	no	9	1,500	13,500
Reinstatement in fields	m^2	750	1	750
Sub total Collection System				**56,250**
Add Prelims and Contengencies @ 20%				11,250
Add Site Investigation @ 5%				2,813
Sub total excl VAT				**70,313**
Add VAT @ 13.5%				9,492
Sub total incl VAT				**79,805**
Add Wayleaves Compensation	m	600	10	6,000
Overheads/Fees/Site Supervision @ 20%				15,961
Total Collection Network				**101,766**

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:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	8 of 9			

BoQ Pipeline Calculation Sheet

Section E

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in roads	m	363	85	30,855
Rising Main in Own Trench	m	373	85	31,705
Rising Main in Common Trench	m	363	35	12,705
Manholes	no	5	1,500	7,500
Service connections	no	21	600	12,600
Temporary Road Reinstatement	m^2	436	35	15,260
Permanent Road reinstatement	m^2	436	50	21,800
Pumping Station	item	1	30,000	30,000
Sub total Collection System				**162,425**
Add Prelims and Contengencies @ 20%				32,485
Add Site Investigation @ 5%				8,121
Sub total excl VAT				**203,031**
Add VAT @ 13.5%				27,409
Sub total incl VAT				**230,440**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				46,088
Total Collection Network				**276,529**

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:	Ballyduff	*1.2*	*30-Mar-07*	*M. Davitt*
Sheet:	9 of 9			

BoQ Pipeline Calculation Sheet

Pipeline Upsizing to 225mm and Network Repairs

Foul Collection Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewers in roads	m	1,624	85	138,040
Temporary Road Reinstatement	m^2	1,949	35	68,215
Permanent Road reinstatement	m^2	1,949	50	97,450
Relining	m	2,334	12	28,008
Reopen Laterals	no	19	190	3,610
Localised Repairs	no	25	600	15,000
Removal of intrusions	no	15	260	3,900
Repair of Defective Laterals	no	16	600	9,600
Associated sewer cleaning and CCTV work	no	1	17,189	17,189
Mahhole Rehab	43	43	800	34,400
Sub total Collection System				**415,412**
Add Prelims and Contengencies @ 20%				83,082
Add Site Investigation @ 5%				20,771
Sub total excl VAT				**519,264**
Add VAT @ 13.5%				70,101
Sub total incl VAT				**589,365**
Add Wayleaves Compensation	m		10	0
Overheads/Fees/Site Supervision @ 20%				117,873
Total Collection Network				**707,238**

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Calculation Sheet

		Rev	Date	By
Project Number:	20367			
Project Name:	Kerry	*Ballyduff*	*28-Mar-07*	*M.Razali*
Sheet:	1 of 1			

BoQ Pipeline Calculation Sheet

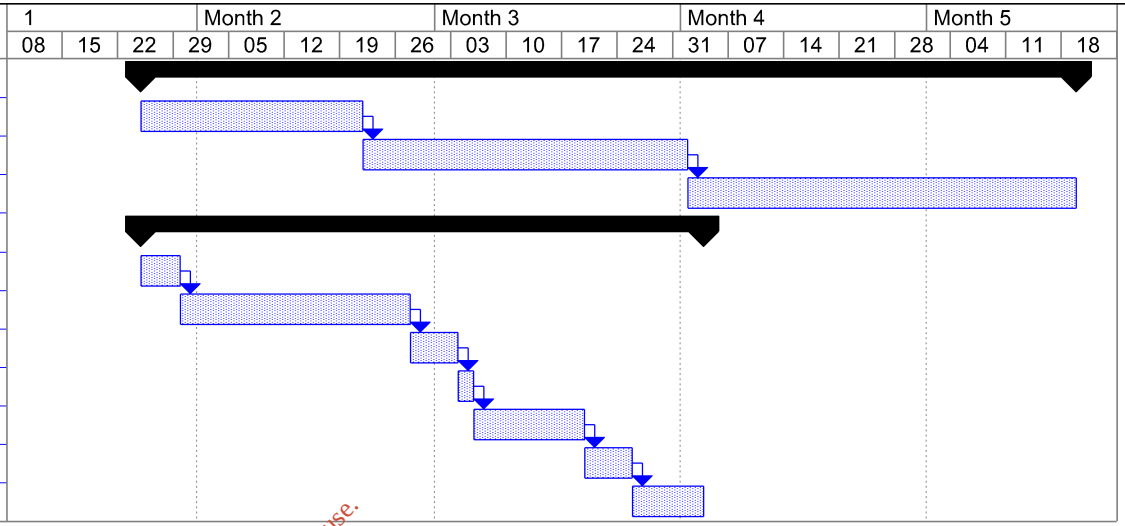
Storm Water Network	**Unit**	**Quantity**	**Rate, €**	**Total, €**
225mm gravity sewer in roads	m	547	85	46,495
300mm gravity sewer in roads	m	278	95	26,410
375mm gravity sewer in roads	m	180	105	18,900
450mm gravity sewer in roads	m	353	115	40,595
225mm gravity sewers in fields	m	414	70	28,945
375mm gravity sewers in fields	m	470	90	42,300
Reinstatement in roads	m^2	1,358	50	67,900
Reinstatement in fields	m^2	884	1	884
Manholes	no	34	1,500	51,000
Outfall	no	5	1,000	5,000
Sub total Collection System				**328,429**
Add Prelims and Contengencies @ 20%				65,686
Add Site Investigation @ 5%				16,421
Sub total excl VAT				**410,536**
Add VAT @ 13.5%				55,422
Sub total incl VAT				**465,958**
Add Wayleaves Compensation	m	884	10	8,835
Overheads/Fees/Site Supervision @ 20%				93,192
Total Collection Network				**567,985**

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 Ballyduff Sewerage Scheme**
2		Mobilisation
3		Repair and Upsize Sewers
4		Lay Sewers Extensions
5		**Build Treatment Plant**
6		Clear Site
7		Build/Install CAST Tanks
8		Build Chamber
9		Install Venturi
10		Connect Pipework
11		Landscape Site
12		Testing/Commissioning



Project: Kerry Wastewater and Sludge
Date: Fri 01/09/06

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	USA5883
Study	DATABASE
Sort Order	--Not Sorted--
Print Mode	GLOBAL
No. Surveys	40
Survey Distance	1819.0
Report	ENGLISH
Date	05/05/2006
Time	09:18

Report comment

Report : ENGLISH Page : 001 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
1	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86348301X

Date	Time	Location
21/03/2006	08:44	BENMORE ROAD , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349401	0.00	0.000	0.000	SQ86348301	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	100.0	22.5	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	MAIN ROAD - URB,-	0001

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	22.50	0.0	0.0	0.0	0.0	0.5	0.5	0.0
Service	22.50	0.0	0.0	0.0	0.0	50.0	4.0	2.2

Extra Data - Structural override
User remarks Service override

Detail

1	0.0	ST	Start Of Survey,	
1	0.0	MH	Manhole, SQ86349401	
1	0.0	WL	Water Level, 10%	
1	0.0	S1 DEG	Debris Grease, at 4 to 5o/c, 5%	
1	0.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	3.0	WL	Water Level, 5%	
	6.9	OJM	Open Joint Medium,	
	12.7	JN	Junction, 100mm at 2o/c,	
	17.0	GO	General Observation, WEBS ON LENS	
	20.0	JN	Junction, 100mm at 12o/c,	
	20.8	DE	Debris, 20% PAPER	
	22.4	DE	Debris, 15%	
	22.5	F1 DEG	Debris Grease, at 4 to 5o/c, 5%	
	22.5	F2 DEG	Debris Grease, at 7 to 8o/c, 5%	
2	22.5	SA	Survey Abandoned, DUE TO DEBRIS IN PIPE	

Report : ENGLISH Page : 002 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
2	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349401X

Date Time Location
21/03/2006 08:51 BENMORE ROAD , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349401	0.00	0.000	0.000	SQ86349501	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	100.0	19.2	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY MAIN ROAD - URB,- 0002

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	18.20	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Service	19.20	0.0	0.0	0.0	0.0	44.0	6.0	2.2

Extra Data - Structural override
User remarks Service override

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

2	0.0	ST	Start Of Survey,
2	0.0	MH	Manhole, SQ86349401
2	0.0	WL	Water Level, 10%
2	0.0 S1	DEG	Debris Grease, at 4 to 5o/c, 5%
2	0.0 S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	5.6	WL	Water Level, 5%
	8.5	JN	Junction, 100mm at 12o/c,
	8.5	GO	General Observation, DIRT ON LENS
	17.4	JN	Junction, 100mm at 9o/c,
	18.0	DEG	Debris Grease, at 4 to 5o/c, 10%
	18.4	DEG	Debris Grease, at 7 to 9o/c, 10%
	18.4	CNI	Connection Intruding, 100mm at 12o/c, Int.50mm
	19.2 F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	19.2 F2	DEG	Debris Grease, at 7 to 8o/c, 5%
3	19.2	SA	Survey Abandoned, DUE TO INTRUDING CONNECTION

Report : ENGLISH Page : 003 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
3	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349401X

Date	Time	Location
21/03/2006	09:02	BENMORE ROAD , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349501	0.00	0.000	0.000	SQ86349401	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	100.0	31.9	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	NONE..	STRUCTURAL/SERVICE	?	-

Weather	Location							
DRY	MAIN ROAD - URB,-							0003

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	26.90	0.0	2.0	2.0	1.0	35.0	33.5	1.1
Service	31.90	0.0	0.0	0.0	0.0	64.0	4.0	2.0

Extra Data - Structural override
User remarks Service override

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

3	0.0	ST	Start Of Survey,
3	0.0	MH	Manhole, SQ86349501
3	0.0	WL	Water Level, 5%
	0.8	GO	General Observation, BACK DROP
	0.8	JDM	Joint Displaced Medium,
	0.8	FL	Fracture Longitudinal, at 12o/c,
	0.8	FC	Fracture Circumferential, at 10 to 12o/c,
	0.8	D	Deformed Pipe, 5%
	1.1	JDM	Joint Displaced Medium,
	1.1	DE	Debris, 20%
	1.1	WL	Water Level, 20%
	3.0	WL	Water Level, 5%
	3.0 S1	DEG	Debris Grease, at 4 to 5o/c, 5%
	3.0 S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	13.7	JDM	Joint Displaced Medium,
	13.7	DE	Debris, 15%
	13.7	WL	Water Level, 20%
	13.8	JN	Junction, 150mm at 3o/c,
	14.0	WL	Water Level, 25%
	14.3	DE	Debris, 10%
	14.3	WL	Water Level, 20%
	15.3	WL	Water Level, 10%
	17.4	JN	Junction, 100mm at 2o/c,
	17.9	JN	Junction, 100mm at 2o/c,
	19.3	WL	Water Level, 5%
	24.0	LL	Line Left, SLIGHT
	30.0	JDM	Joint Displaced Medium,
	31.8	CNI	Connection Intruding, 100mm at 10o/c, Int.40mm
	31.9	CNI	Connection Intruding, 100mm at 10o/c, Int.40mm

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Report : ENGLISH Page : 004 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

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3 Plr SQ86349401X Dir UPSTREAM Date 21/03/2006 Time 09:02
Location: BENMORE ROAD , BALLYDUFF

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

	31.9	F1 DEG	Debris Grease, at 4 to 5o/c, 5%	
	31.9	F2 DEG	Debris Grease, at 7 to 8o/c, 5%	
4	31.9	SA	Survey Abandoned,	
			DUE TO INTRUDING CONNECTION	

Report : ENGLISH Page : 005 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
4	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349501X

Date	Time	Location
21/03/2006	09:26	BENMORE ROAD , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349501	0.00	0.000	0.000	SQ86349502	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	67.9	67.9	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	NONE..	STRUCTURAL/SERVICE	?	-

Weather	Location	
DRY	MAIN ROAD - URB,-	0004

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	64.90	0.0	1.0	0.0	2.0	35.5	15.0	0.5
Service	66.90	1.0	0.0	0.0	0.0	147.0	4.0	2.2

Extra Data - Structural override
User remarks Service override

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

4	0.0		ST	Start Of Survey,
4	0.0		MH	Manhole, SQ86349501
4	0.0		WL	Water Level, 10%
4	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
4	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	2.3		WL	Water Level, 5%
	7.8		WL	Water Level, 10%
	10.0		WL	Water Level, 5%
	15.8		WL	Water Level, 10%
	16.9		WL	Water Level, 20%
	17.8	S3	DE	Debris, 5%
	18.9		WL	Water Level, 15%
	19.6		WL	Water Level, 10%
	19.6	F3	DE	Debris, 5%
	23.8		LR	Line Right, SLIGHT
	26.2		JN	Junction, 100mm at 10o/c,
	29.0		WL	Water Level, 15%
	29.6		WL	Water Level, 20%
	30.0		WL	Water Level, 25%
	31.0		WL	Water Level, 20%
	31.7		WL	Water Level, 10%
	34.5		WL	Water Level, 5%
	37.0		WL	Water Level, 10%
	37.8		D	Deformed Pipe, 5%
	37.8		LL	Line Left,
	38.0		WL	Water Level, 15%
	38.0		WL	Water Level, 20%
	38.7		D	Deformed Pipe, 5%
	39.3		WL	Water Level, 15%
	43.0		DE	Debris, 10% PAPER

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4 Plr SQ86349501X Dir DOWNSTREAM Date 21/03/2006 Time 09:26
Location: BENMORE ROAD , BALLYDUFF

Detail (cont.)

	44.5		WL	Water Level, 10%
	45.0		WL	Water Level, 15%
	45.7		WL	Water Level, 10%
	52.4		JDM	Joint Displaced Medium,
	52.8		WL	Water Level, 5%
	53.6		WL	Water Level, 10%
	54.8		LR	Line Right, SLIGHT
	55.5		WL	Water Level, 15%
	57.3		WL	Water Level, 10%
	60.3		LR	Line Right, SLIGHT
	62.8		WL	Water Level, 15%
	63.6		WL	Water Level, 20%
	64.0		WL	Water Level, 25%
	64.6		DES	Debris Silt, 20%
	65.0		WL	Water Level, 30%
	65.6		DES	Debris Silt, 20%
	67.4		FL	Fracture Longitudinal, at 12o/c,
	67.4		ID	Infiltration Dripper, at 12o/c,
	67.4		WL	Water Level, 20%
	67.4		DES	Debris Silt, 10%
	67.4		LL	Line Left,
	67.9	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	67.9	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	67.9		MH	Manhole, SQ86349502
5	67.9		FH	Finished Survey,

Report : ENGLISH Page : 007 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
5	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349502X

Date	Time	Location
21/03/2006	09:59	MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349601	0.00	0.000	0.000	SQ86349502	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	150	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	100.0	32.7	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location
DRY	MAIN ROAD - URB,ON ROAD OUTSIDE LONDIS 0005

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	31.70	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Service	30.70	2.0	0.0	0.0	0.0	43.0	4.0	1.3

Extra Data - Structural override
User remarks Service override

Detail

5	0.0		ST	Start Of Survey,
5	0.0		MH	Manhole, SQ86349601
5	0.0		WL	Water Level, 20%
5	0.0	S1	DEG	Debris Grease, at 7 to 5o/c, 5%
	2.0		WL	Water Level, 15%
	10.0		WL	Water Level, 10%
	12.5		WL	Water Level, 15%
	18.3		JN	Junction, 100mm at 3o/c,
	20.5		CN	Connection, 100mm at 2o/c,
	21.0		WL	Water Level, 10%
	25.5	C1	DEG	Debris Grease, at 4 to 5o/c, 5%
	25.5	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	28.2		WL	Water Level, 15%
	30.1		ELJ	Encrustation Light At Joint, at 1 to 5o/c,
	30.1		ELJ	Encrustation Light At Joint, at 7 to 9o/c,
	30.8		JN	Junction, 100mm at 10o/c,
	30.8		WL	Water Level, 10%
	32.7		CNI	Connection Intruding, 100mm at 11o/c, Int.100mm
	32.7	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	32.7	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
6	32.7		SA	Survey Abandoned, DUE TO INTRUDING CONNECTION

Report : ENGLISH Page : 008 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
6	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349601X

Date	Time	Location
21/03/2006	10:10	MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349601	0.00	0.000	0.000	SQ86349705	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	53.1	53.1	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	MAIN ROAD - URB,OUTSIDE LONDIS	0006

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	51.10	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Service	52.10	0.0	0.0	1.0	0.0	64.0	4.0	1.2

Extra Data - Structural override
User remarks Service override

Detail

6	0.0	ST	Start Of Survey,
6	0.0	MH	Manhole, SQ86349601
6	0.0	WL	Water Level, 10%
	10.9	JN	Junction, 100mm at 3o/c,
	19.2	JN	Junction, 100mm at 10o/c,
	19.9	CNI	Connection Intruding, 100mm at 11o/c, Int.20mm
	23.8	JN	Junction, 100mm at 9o/c,
	23.8 S1	DEG	Debris Grease, at 4 to 5o/c, 5%
	23.8 S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	46.4	JN	Junction, 100mm at 9o/c,
	48.2	JN	Junction, 100mm at 3o/c,
	51.9	CX	Connection Defective, 100mm at 9o/c,
	51.9	EM	Encrustation Medium, at 7 to 10o/c, 10%
	53.1 F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	53.1 F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	53.1	MH	Manhole, SQ86349705
7	53.1	FH	Finished Survey,

Report : ENGLISH Page : 009 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
7	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349705X

Date	Time	Location
21/03/2006	10:21	MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349705	0.00	0.000	0.000	SQ86349701	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	45.6	45.6	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	MAIN ROAD - URB,-	0007

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	35.60	0.0	10.0	0.0	0.0	143.0	75.0	3.1
Service	44.60	1.0	0.0	0.0	0.0	93.0	3.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

7	0.0		ST	Start Of Survey,
7	0.0		MH	Manhole, SQ86349705
7	0.0		WL	Water Level, 10%
7	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
7	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	22.4		JN	Junction, 100mm at 3o/c,
	23.2		FL	Fracture Longitudinal, at 12o/c,
	23.2		FL	Fracture Longitudinal, at 2o/c,
	23.2		FL	Fracture Longitudinal, at 3o/c,
	23.2		FL	Fracture Longitudinal, at 9o/c,
	23.2		FL	Fracture Longitudinal, at 10o/c,
	38.3		JN	Junction, 100mm at 3o/c,
	38.4		FL	Fracture Longitudinal, at 11o/c,
	38.4		ELJ	Encrustation Light At Joint, at 7 to 11o/c,
	39.0		FL	Fracture Longitudinal, at 3o/c,
	39.0		FL	Fracture Longitudinal, at 8o/c,
	39.0		FC	Fracture Circumferential, at 7 to 10o/c,
	39.0		FL	Fracture Longitudinal, at 12o/c,
	45.6	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	45.6	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	45.6		MH	Manhole, SQ86349701
8	45.6		FH	Finished Survey,

Report : ENGLISH Page : 010 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
8	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86347701X

Date	Time	Location
21/03/2006	10:33	THE SQUARE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86347701	0.00	0.000	0.000	SQ86347702	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	50.0	5.1	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	LIGHT ROAD ,-	0008

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	5.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	5.10	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, SQ86347701
8	0.0	WL	Water Level, 15%
	1.0	WL	Water Level, 20%
	2.0	WL	Water Level, 30%
	2.5	WL	Water Level, 40%
	3.8	WL	Water Level, 60%
	4.7	CU	Camera Underwater,
	4.7	WL	Water Level, 80%
9	5.1	SA	Survey Abandoned, DUE TO HIGH WATER LEVEL

Report : ENGLISH Page : 011 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
9	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86347703X

Date	Time	Location
21/03/2006	10:56	THE SQUARE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86347703	0.00	0.000	0.000	SQ86347702	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	50.0	0.7	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	LIGHT ROAD ,OUTSIDE SCHOOL	0009

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

9	0.0	ST	Start Of Survey,
9	0.0	MH	Manhole, SQ86347703
9	0.0	WL	Water Level, 99%
10	0.7	SA	Survey Abandoned, MANHOLE SURCHARGED

Report : ENGLISH Page : 012 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
10	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349704X

Date 21/03/2006 Time 11:00 Location THE SQUARE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349704	0.00	0.000	0.000	SQ86349701	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	150	CIRCULAR	CONCRETE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	1.0	40.6	40.6	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather DRY Location LIGHT ROAD ,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	37.60	2.0	0.0	1.0	0.0	64.0	60.0	1.6
Service	40.60	0.0	0.0	0.0	0.0	88.0	5.0	2.1

Extra Data - Structural override
User remarks Service override

Detail

10	0.0		ST	Start Of Survey,
10	0.0		MH	Manhole, SQ86349704
10	0.0		WL	Water Level, 20%
10	0.0	S1	DEG	Debris Grease, at 11 to 1o/c, 5%
	2.0	F1	DEG	Debris Grease, at 11 to 1o/c, 5%
	2.4		DE	Debris, 20%
	2.4	S2	DEG	Debris Grease, at 4 to 5o/c, 5%
	2.4	S3	DEG	Debris Grease, at 7 to 8o/c, 5%
	4.4		DE	Debris, 15%
	5.0		WL	Water Level, 10%
	12.5		JN	Junction, 100mm at 2o/c,
	19.8		CL	Crack Longitudinal, at 1o/c,
	19.8		CL	Crack Longitudinal, at 12o/c,
	19.8		JN	Junction, 100mm at 9o/c,
	21.1		B	Broken Pipe, at 12 to 1o/c,
	21.1		DE	Debris, 20% CLOTH
	23.6		JN	Junction, 100mm at 10o/c,
	24.5		JN	Junction, 100mm at 3o/c,
	34.0		DE	Debris, 5%
	40.6	F2	DEG	Debris Grease, at 4 to 5o/c, 5%
	40.6	F3	DEG	Debris Grease, at 7 to 8o/c, 5%
	40.6		MH	Manhole, SQ86349701
11	40.6		FH	Finished Survey,

Report : ENGLISH Page : 013 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
11	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86348703X

Date 21/03/2006 Time 11:17 Location THE SQUARE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349704	0.00	0.000	0.000	SQ86348703	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	38.0	38.0	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather DRY Location LIGHT ROAD ,-

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	38.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	38.00	0.0	0.0	0.0	0.0	97.0	4.0	2.5

Extra Data - Structural override 0011
User remarks Service override

Detail

11	0.0	ST	Start Of Survey,	
11	0.0	MH	Manhole, SQ86349704	
11	0.0	WL	Water Level, 15%	
11	0.0	S1 DEG	Debris Grease, at 4 to 5o/c, 5%	
11	0.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%	
11	0.0	S3 DEG	Debris Grease, at 10 to 2o/c, 5% IN PATCHES	
	3.0	WL	Water Level, 10%	
	16.0	F3 DEG	Debris Grease, at 10 to 2o/c, 5% IN PATCHES	
	36.9	DE	Debris, 20%	
	37.0	WL	Water Level, 20%	
	38.0	F2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	38.0	F1 DEG	Debris Grease, at 4 to 5o/c, 5%	
	38.0	MH	Manhole, SQ86348703	
12	38.0	FH	Finished Survey,	

Report : ENGLISH Page : 014 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
12	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86348701X

Date	Time	Location
21/03/2006	11:36	THE SQUARE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86348701	0.00	0.000	0.000	SQ86348703	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	5.4	5.4	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	LIGHT ROAD ,-	0012

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	5.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	5.40	0.0	0.0	0.0	0.0	12.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

12	0.0	ST	Start Of Survey,	
12	0.0	MH	Manhole, SQ86348701	
12	0.0	WL	Water Level, 10%	
12	0.0 S1	DEG	Debris Grease, at 4 to 5o/c, 5%	
12	0.0 S2	DEG	Debris Grease, at 7 to 8o/c, 5%	
	5.3 F1	DEG	Debris Grease, at 4 to 5o/c, 5%	
	5.4 F2	DEG	Debris Grease, at 7 to 8o/c, 5%	
	5.4	MH	Manhole, SQ86348703	
13	5.4	FH	Finished Survey,	

Report : ENGLISH Page : 015 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
13	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86348603X

Date 21/03/2006 Time 11:48 Location THE SQUARE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86348701	0.00	0.000	0.000	SQ86348603	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	60.3	60.3	Z	00001

VT Machine Comments: SONY DVD — SURVEY OF EXISTING FOUL SEWER..
Purpose: STRUCTURAL/SERVICE Cat B Pre -
Weather: DRY Location: LIGHT ROAD ,- 0013

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	49.30	0.0	2.0	2.0	7.0	100.5	15.0	1.6
Service	60.30	0.0	0.0	0.0	0.0	122.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

13	0.0		ST	Start Of Survey,
13	0.0		MH	Manhole, SQ86348701
13	0.0		WL	Water Level, 10%
13	0.0	S1 DEG		Debris Grease, at 4 to 5o/c, 5%
13	0.0	S2 DEG		Debris Grease, at 7 to 8o/c, 5%
	4.1		LR	Line Right, SLIGHT
	15.5		CX	Connection Defective, 100mm at 12o/c,
	15.5		FL	Fracture Longitudinal, at 12o/c,
	20.2		D	Deformed Pipe, 5%
	21.2		D	Deformed Pipe, 5%
	23.7		D	Deformed Pipe, 5%
	24.4		CX	Connection Defective, 100mm at 12o/c,
	24.4		FL	Fracture Longitudinal, at 12o/c,
	26.1		D	Deformed Pipe, 5%
	29.4		D	Deformed Pipe, 5%
	33.1		D	Deformed Pipe, 5%
	37.4		D	Deformed Pipe, 5%
	49.8		WL	Water Level, 15%
	51.5		WL	Water Level, 10%
	59.1		JDM	Joint Displaced Medium,
	59.2		LR	Line Right,
	60.3	F1 DEG		Debris Grease, at 4 to 5o/c, 5%
	60.3	F2 DEG		Debris Grease, at 7 to 8o/c, 5%
	60.3		MH	Manhole, SQ86348603
14	60.3		FH	Finished Survey,

Report : ENGLISH Page : 016 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
14	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349701X

Date Time Location
21/03/2006 12:00 MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349701	0.00	0.000	0.000	SQ86349801	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	89.6	89.6	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY LIGHT ROAD ,OUTSIDE BROWNE'S BAR 0014

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	77.60	1.0	11.0	0.0	0.0	124.0	46.0	1.4
Service	86.60	3.0	0.0	0.0	0.0	183.0	3.0	2.0

Extra Data - Structural override
User remarks Service override

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

14	0.0	ST	Start Of Survey,	
14	0.0	MH	Manhole, SQ86349701	
14	0.0	WL	Water Level, 10%	
14	0.0	S1 DEG	Debris Grease, at 4 to 5o/c, 5%	
14	0.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	7.0	JN	Junction, 150mm at 2o/c,	
	20.1	JN	Junction, 150mm at 2o/c, BLANKED OFF	
	22.4	JN	Junction, 150mm at 10o/c,	
	23.7	JN	Junction, 150mm at 9o/c, BLANKED OFF	
	34.3	JN	Junction, 150mm at 9o/c,	
	38.8	JN	Junction, 150mm at 3o/c,	
	59.5	JN	Junction, 150mm at 3o/c,	
	60.7	ELJ	Encrustation Light At Joint, at 8 to 10o/c,	
	63.5	CC	Crack Circumferential, at 7 to 2o/c,	
	64.9	JN	Junction, 150mm at 9o/c,	
	66.2	FC	Fracture Circumferential, at 8 to 12o/c,	
	66.2	FL	Fracture Longitudinal, at 3o/c,	
	66.2	FC	Fracture Circumferential, at 8 to 9o/c,	
	66.2	FL	Fracture Longitudinal, at 10o/c,	
	67.7	CN	Connection, 150mm at 11o/c,	
	67.7	EL	Encrustation Light, at 12 to 3o/c,	
	75.6	JN	Junction, 150mm at 10o/c, BLANKED OFF	
	79.3	JN	Junction, 150mm at 9o/c,	
	82.4	FC	Fracture Circumferential, at 8 to 4o/c,	
	82.4	FL	Fracture Longitudinal, at 12o/c,	
	82.4	EL	Encrustation Light, at 8 to 4o/c,	
	82.4	FL	Fracture Longitudinal, at 11o/c,	
	86.2	FC	Fracture Circumferential, at 7 to 11o/c,	

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

14 Plr SQ86349701X Dir DOWNSTREAM Date 21/03/2006 Time 12:00
Location: MAIN STREET , BALLYDUFF

Detail (cont.)

	86.2		FC	Fracture Circumferential, at 9 to 10o/c,
	86.2		FC	Fracture Circumferential, at 2 to 5o/c,
	86.2		FL	Fracture Longitudinal, at 3o/c,
	87.6		WL	Water Level, 20%
	89.3		GO	General Observation, FLOW MONITOR
	89.6	F1 DEG		Debris Grease, at 4 to 5o/c, 5%
	89.6	F2 DEG		Debris Grease, at 7 to 8o/c, 5%
	89.6		MH	Manhole, SQ86349801
15	89.6		FH	Finished Survey,

Report : ENGLISH Page : 018 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
15	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349703X

Date	Time	Location
21/03/2006	12:24	MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ86349701	0.00	0.000	0.000	SQ86349703	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	250	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	20.1	20.1	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location
DRY	LIGHT ROAD ,OUTSIDE BROWNE'S BAR 0015

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	20.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	20.10	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, SQ86349701
15	0.0	WL	Water Level, 5%
	8.4	LR	Line Right,
	14.3	LL	Line Left, SLIGHT
	20.1	MH	Manhole, SQ86349703
16	20.1	FH	Finished Survey,

Report : ENGLISH Page : 019 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
16	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87340901X

Date Time Location
21/03/2006 12:35 MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87340901	0.00	0.000	0.000	SQ87340903	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	38.4	38.4	Z	00001

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY MAIN ROAD - URB, ON ROAD OUTSIDE BALLYDUFF PHARMACY 0016

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	31.40	0.0	6.0	1.0	0.0	83.0	68.0	2.1
Service	33.40	5.0	0.0	0.0	0.0	94.0	5.0	2.4

Extra Data - Structural override
User remarks Service override

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

16	0.0		ST	Start Of Survey,
16	0.0		MH	Manhole, SQ87340901
16	0.0		WL	Water Level, 10%
16	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
16	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	1.6		WL	Water Level, 15%
	3.9		CX	Connection Defective, 150mm at 1o/c,
	3.9		EL	Encrustation Light, at 7 to 4o/c,
	3.9	S3	DES	Debris Silt, 5%
	6.3		WL	Water Level, 20%
	6.9		DE	Debris, 15%
	9.0		WL	Water Level, 10%
	10.0	F3	DES	Debris Silt, 5%
	12.0		CN	Connection, 150mm at 12o/c,
	12.3		DE	Debris, 5%
	14.6		WL	Water Level, 15%
	16.3		WL	Water Level, 10%
	20.3		FL	Fracture Longitudinal, at 11o/c,
	20.3		FL	Fracture Longitudinal, at 1o/c,
	20.3		FL	Fracture Longitudinal, at 3o/c,
	20.3		ELJ	Encrustation Light At Joint, at 8 to 4o/c,
	20.3		FL	Fracture Longitudinal, at 10o/c,
	20.3		FC	Fracture Circumferential, at 12 to 4o/c,
	20.3		WL	Water Level, 15%
	23.6		WL	Water Level, 10%
	28.3		JN	Junction, 100mm at 1o/c,
	28.3		WL	Water Level, 15%
	29.8		WL	Water Level, 10%
	32.9		JN	Junction, 100mm at 10o/c, BLANKED OFF
	35.0		WL	Water Level, 15%

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Report : ENGLISH Page : 020 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

16 Plr SQ87340901X Dir DOWNSTREAM Date 21/03/2006 Time 12:35
Location: MAIN STREET , BALLYDUFF

Detail (cont.)

	37.0		WL	Water Level, 10%
	37.2		FL	Fracture Longitudinal, at 12o/c,
	37.2		EL	Encrustation Light, at 10 to 12o/c,
	37.3		EL	Encrustation Light, at 3 to 5o/c,
	37.3		EL	Encrustation Light, at 7 to 9o/c,
	38.4	F1 DEG		Debris Grease, at 4 to 5o/c, 5%
	38.4	F2 DEG		Debris Grease, at 7 to 8o/c, 5%
	38.4		MH	Manhole, SQ87340903
17	38.4		FH	Finished Survey,

Report : ENGLISH Page : 021 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
17	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87340903X

Date	Time	Location
21/03/2006	12:53	MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87340903	0.00	0.000	0.000	SQ87340904	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	3.8	3.8	Z	00001

VT	Machine	Comments	Purpose	Cat	Pre
	SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location		
DRY	GARDENS	,-	0017

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	2.80	0.0	1.0	0.0	0.0	15.0	15.0	3.8
Service	2.80	1.0	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, SQ87340903
17	0.0	WL	Water Level, 15%
	0.7	FL	Fracture Longitudinal, at 12o/c,
	0.7	EL	Encrustation Light, at 7 to 5o/c,
	1.0	WL	Water Level, 10%
	3.8	MH	Manhole, SQ87340904
18	3.8	FH	Finished Survey,

Report : ENGLISH Page : 022 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
18	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ86349801X

Date Time Location
21/03/2006 12:57 MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87340901	0.00	0.000	0.000	SQ86349801	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	94.4	94.4	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY MAIN ROAD - URB,OUTSIDE BALLYDUFF PHARMACY 0018

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	73.40	17.0	3.0	1.0	0.0	60.0	23.0	0.6
Service	81.40	13.0	0.0	0.0	0.0	222.0	7.0	2.3

Extra Data - Structural override
User remarks Service override

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

1	0.0	ST	Start Of Survey,
1	0.0	MH	Manhole, SQ87340901
1	0.0	WL	Water Level, 15%
1	0.0	S1 DEG	Debris Grease, at 4 to 5o/c, 5%
1	0.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%
	1.2	ELJ	Encrustation Light At Joint, at 7 to 5o/c,
	1.2	CL	Crack Longitudinal, at 12o/c,
	6.2	WL	Water Level, 10%
	10.0	WL	Water Level, 15%
	15.1	JN	Junction, 150mm at 1o/c,
	15.1	WL	Water Level, 10%
	17.1	JN	Junction, 150mm at 2o/c, BLANKED OFF
	19.6	WL	Water Level, 15%
	24.4	WL	Water Level, 10%
	26.9	DE	Debris, 25% PAPER
	27.0	WL	Water Level, 30%
	29.0	WL	Water Level, 20%
	30.4	FC	Fracture Circumferential, at 9 to 3o/c,
	30.4	FL	Fracture Longitudinal, at 12o/c,
	30.4	ELJ	Encrustation Light At Joint, at 9 to 3o/c,
	32.5	JN	Junction, 150mm at 2o/c, BLANKED OFF
	33.9	CNI	Connection Intruding, 100mm at 1o/c, Int.5mm
	34.2	JN	Junction, 150mm at 3o/c,
	34.8	WL	Water Level, 10%
	34.8	CL	Crack Longitudinal, at 3o/c,
	38.6	ELJ	Encrustation Light At Joint, at 7 to 5o/c,
	38.6	FC	Fracture Circumferential, at 9 to 3o/c,
	43.5	WL	Water Level, 15%

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18 Plr SQ86349801X Dir UPSTREAM Date 21/03/2006 Time 12:57
Location: MAIN STREET , BALLYDUFF

Detail (cont.)

47.9		JN	Junction, 150mm at 9o/c,
47.9		WL	Water Level, 20%
49.5		JN	Junction, 100mm at 3o/c,
49.7		CL	Crack Longitudinal, at 3o/c,
49.7		CC	Crack Circumferential, at 2 to 4o/c,
49.7		WL	Water Level, 15%
51.5		JN	Junction, 150mm at 10o/c,
51.5		EL	Encrustation Light, at 7 to 9o/c,
51.5		ELJ	Encrustation Light At Joint, at 1 to 5o/c,
53.0		WL	Water Level, 20%
55.7		WL	Water Level, 15%
58.8		WL	Water Level, 20%
59.7		CL	Crack Longitudinal, at 1o/c,
59.7		CL	Crack Longitudinal, at 11o/c,
59.7		ELJ	Encrustation Light At Joint, at 8 to 4o/c,
59.7		DE	Debris, 10%
61.1		DE	Debris, 10%
68.4		JN	Junction, 150mm at 9o/c,
68.4		CC	Crack Circumferential, at 7 to 5o/c,
68.4		CL	Crack Longitudinal, at 12o/c,
68.4		CC	Crack Circumferential, at 12 to 5o/c,
68.4		CL	Crack Longitudinal, at 3o/c,
68.4		EL	Encrustation Light, at 3 to 4o/c,
68.4		CL	Crack Longitudinal, at 1o/c,
70.0		WL	Water Level, 10%
73.0		WL	Water Level, 15%
74.0		EL	Encrustation Light, at 7 to 5o/c,
74.8		CL	Crack Longitudinal, at 11o/c,
74.8		CC	Crack Circumferential, at 11 to 1o/c,
74.8		CL	Crack Longitudinal, at 3o/c,
75.6		ELJ	Encrustation Light At Joint, at 7 to 5o/c,
75.6		CC	Crack Circumferential, at 11 to 3o/c,
75.6		WL	Water Level, 20%
78.5		JN	Junction, 150mm at 9o/c,
78.6		CL	Crack Longitudinal, at 11o/c,
78.6		EL	Encrustation Light, at 1 to 5o/c,
80.3		EL	Encrustation Light, at 7 to 5o/c,
80.3		WL	Water Level, 10%
81.3		WL	Water Level, 15%
82.4		EL	Encrustation Light, at 11 to 4o/c,
83.0		WL	Water Level, 10%
84.8		JN	Junction, 150mm at 3o/c,
84.9		CL	Crack Longitudinal, at 12o/c,
86.0		WL	Water Level, 15%
89.9	S3	DE	Debris, 5%
91.6	C3	DE	Debris, 10%
91.6		WL	Water Level, 20%
93.1		ELJ	Encrustation Light At Joint, at 7 to 5o/c,
94.4	F3	DE	Debris, 10%
94.4	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
94.4	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
94.4		MH	Manhole, SQ86349801

continued...

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Report  : ENGLISH        Page : 024              Date    : 05/05/2006 (09:18)
Database: USA5883        Study: DATABASE         Sorted  : --Not Sorted--
================================================================================
     18  Plr  SQ86349801X  Dir  UPSTREAM    Date  21/03/2006  Time  12:57
    Location:  MAIN STREET                    , BALLYDUFF
------------------------------- Detail (cont.) -------------------------------
2         94.4    FH   Finished Survey,
--------------------------------------------------------------------------------
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Report : ENGLISH Page : 025 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
19	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87350001X

Date	Time	Location
21/03/2006	13:24	MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87340901	0.00	0.000	0.000	SQ87350001	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	69.2	69.2	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location
DRY	MAIN ROAD - URB,OUTSIDE BALLYDUFF PHARMACY 0019

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	69.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	69.20	0.0	0.0	0.0	0.0	142.0	4.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

2	0.0		ST	Start Of Survey,
2	0.0		MH	Manhole, SQ87340901
2	0.0		WL	Water Level, 10%
2	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
2	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	4.0		WL	Water Level, 15%
	5.3		WL	Water Level, 10%
	35.7		DE	Debris, 10% PAPER
	69.2	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	69.2	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	69.2		MH	Manhole, SQ87350001
3	69.2		FH	Finished Survey,

Report : ENGLISH Page : 026 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
20	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87350002X

Date	Time	Location
21/03/2006	13:36	MAIN STREET , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87350001	0.00	0.000	0.000	SQ87350002	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	10.5	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	MAIN ROAD - URB,-	0020

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	10.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	10.50	0.0	0.0	0.0	0.0	27.0	7.0	2.5

Extra Data - Structural override
User remarks Service override

Detail

3	0.0	ST	Start Of Survey,
3	0.0	MH	Manhole, SQ87350001
3	0.0	WL	Water Level, 10%
3	0.0 S1	DEG	Debris Grease, at 4 to 5o/c, 5%
3	0.0 S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	10.0	DE	Debris, 40% STONES & PAPER
	10.5 F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	10.5 F2	DEG	Debris Grease, at 7 to 8o/c, 5%
4	10.5	SA	Survey Abandoned, DUE TO DEBRIS IN PIPE

Report : ENGLISH Page : 027 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
21	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87340905X

Date 21/03/2006 Time 13:49 Location MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87350003	0.00	0.000	0.000	SQ87340905	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	56.3	56.3	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather DRY Location LIGHT ROAD ,- 0021

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	46.30	0.0	1.0	8.0	1.0	145.5	85.0	2.6
Service	56.30	0.0	0.0	0.0	0.0	114.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

4	0.0		ST	Start Of Survey,
4	0.0		MH	Manhole, SQ87350003
4	0.0		WL	Water Level, 10%
4	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
4	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	4.5		LL	Line Left,
	6.7		CNI	Connection Intruding, 100mm at 12o/c, Int.40mm
	10.4		CNI	Connection Intruding, 100mm at 12o/c, Int.20mm
	17.0		LL	Line Left, SLIGHT
	26.4		CNI	Connection Intruding, 100mm at 12o/c, Int.20mm
	27.2		CNI	Connection Intruding, 100mm at 12o/c, Int.25mm
	31.7		CNI	Connection Intruding, 100mm at 12o/c, Int.15mm
	44.2		JDM	Joint Displaced Medium,
	44.2		LR	Line Right,
	46.3		B	Broken Pipe, at 11 to 1o/c, REPAIRED
	46.3		WL	Water Level, 15%
	49.5		B	Broken Pipe, at 12 to 5o/c, CAPPED
	49.5		CXI	Connection Defective/Intruding, 100mm at 1o/c, Int.5mm
	49.5		FL	Fracture Longitudinal, at 11o/c,
	49.5		D	Deformed Pipe, 5%
	50.2		LR	Line Right,
	54.0		LR	Line Right,
	56.3	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	56.3	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	56.3		MH	Manhole, SQ87340905
5	56.3		FH	Finished Survey,

Report : ENGLISH Page : 028 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
22	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87340906X

Date Time Location
21/03/2006 14:03 MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87340905	0.00	0.000	0.000	SQ87340906	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	19.4	19.4	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY LIGHT ROAD ,- 0022

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	18.40	0.0	0.0	1.0	0.0	61.5	60.5	3.1
Service	19.40	0.0	0.0	0.0	0.0	38.0	2.0	1.9

Extra Data - Structural override
User remarks Service override

Detail

5	0.0	ST	Start Of Survey,
5	0.0	MH	Manhole, SQ87340905
5	0.0	WL	Water Level, 10%
	0.7	JDM	Joint Displaced Medium,
	0.7	LR	Line Right,
	1.0 S1	DEG	Debris Grease, at 4 to 5o/c, 5%
	1.0 S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	1.0	WL	Water Level, 15%
	6.0	WL	Water Level, 10%
	6.8	LR	Line Right,
	6.8	JDM	Joint Displaced Medium,
	7.4	WL	Water Level, 25%
	8.4	WL	Water Level, 30%
	10.4	WL	Water Level, 40%
	11.0	WL	Water Level, 20%
	12.0	WL	Water Level, 15%
	15.6	WL	Water Level, 10%
	18.0	B	Broken Pipe, at 1 to 5o/c,
	18.0	JDM	Joint Displaced Medium,
	19.4 F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	19.4 F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	19.4	MH	Manhole, SQ87340906
6	19.4	FH	Finished Survey,

Report : ENGLISH Page : 029 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
23	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87340904X

Date Time Location
21/03/2006 14:10 MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87340906	0.00	0.000	0.000	SQ87340904	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	22.3	22.3	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY GARDENS ,- 0023

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	21.30	1.0	0.0	0.0	0.0	2.0	2.0	0.1
Service	22.30	0.0	0.0	0.0	0.0	44.0	2.0	1.9

Extra Data - Structural override
User remarks Service override

Detail

6	0.0	ST	Start Of Survey,
6	0.0	MH	Manhole, SQ87340906
6	0.0	WL	Water Level, 10%
	0.7	OJL	Open Joint Large,
	1.0	LL	Line Left,
	1.0	MC	Material Change, CONCRETE
	1.0 S1	DEG	Debris Grease, at 4 to 5o/c, 5%
	1.0 S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	4.2	JN	Junction, 150mm at 1o/c,
	22.3 F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	22.3 F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	22.3	MH	Manhole, SQ87340904
7	22.3	FH	Finished Survey,

Report : ENGLISH Page : 030 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
24	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87350003X

Date	Time	Location
21/03/2006	14:21	MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87350003	0.00	0.000	0.000	SQ87351001	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	24.7	24.7	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location		
DRY	LIGHT ROAD ,-		0024

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	21.70	0.0	0.0	2.0	1.0	10.0	10.0	0.4
Service	24.70	0.0	0.0	0.0	0.0	50.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

7	0.0		ST	Start Of Survey,
7	0.0		MH	Manhole, SQ87350003
7	0.0		WL	Water Level, 10%
7	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
7	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	0.8		LR	Line Right,
	6.7		D	Deformed Pipe, 5%
	9.0		WL	Water Level, 20%
	11.1		CNI	Connection Intruding, 150mm at 12o/c, Int.30mm
	13.0		WL	Water Level, 15%
	13.2		LR	Line Right, SLIGHT
	16.0		WL	Water Level, 10%
	18.8		LR	Line Right,
	24.4		CNI	Connection Intruding, 150mm at 12o/c, Int.20mm
	24.7		LR	Line Right,
	24.7	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	24.7	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	24.7		MH	Manhole, SQ87351001
8	24.7		FH	Finished Survey,

Report : ENGLISH Page : 031 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
25	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87351001X

Date	Time	Location
21/03/2006	14:29	MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87351001	0.00	0.000	0.000	SQ87351002	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	63.0	63.0	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location		
DRY	LIGHT ROAD ,-		0025

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	63.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	63.00	0.0	0.0	0.0	0.0	128.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

8	0.0		ST	Start Of Survey,
8	0.0		MH	Manhole, SQ87351001
8	0.0		WL	Water Level, 10%
8	0.0	S1 DEG		Debris Grease, at 4 to 5o/c, 5%
8	0.0	S2 DEG		Debris Grease, at 7 to 8o/c, 5%
	3.0		LR	Line Right, SLIGHT
	57.0		WL	Water Level, 20%
	60.5		WL	Water Level, 15%
	62.0		LR	Line Right,
	62.0		WL	Water Level, 10%
	63.0	F1 DEG		Debris Grease, at 4 to 5o/c, 5%
	63.0	F2 DEG		Debris Grease, at 7 to 8o/c, 5%
	63.0		MH	Manhole, SQ87351002
9	63.0		FH	Finished Survey,

Report : ENGLISH Page : 032 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
26	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87351002X

Date Time Location
21/03/2006 14:36 MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87351002	0.00	0.000	0.000	SQ87351003	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	DOWNSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	15.8	15.8	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY FIELDS ,- 0026

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	15.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	15.80	0.0	0.0	0.0	0.0	32.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

9	0.0		ST	Start Of Survey,
9	0.0		MH	Manhole, SQ87351002
9	0.0		WL	Water Level, 10%
9	0.0	S1 DEG		Debris Grease, at 4 to 5o/c, 5%
9	0.0	S2 DEG		Debris Grease, at 7 to 8o/c, 5%
	9.0		WL	Water Level, 20%
	10.4		LR	Line Right, SLIGHT
	15.8		WL	Water Level, 10%
	15.8	F1 DEG		Debris Grease, at 4 to 5o/c, 5%
	15.8	F2 DEG		Debris Grease, at 7 to 8o/c, 5%
	15.8		MH	Manhole, SQ87351003
10	15.8		FH	Finished Survey,

Report : ENGLISH Page : 033 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
27	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87351003X

Date	Time	Location
21/03/2006	14:59	MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87352001	0.00	0.000	0.000	SQ87351003	0.00	0.000	0.000

Use	Direction	Size	Shape	Material
FOUL	UPSTREAM	225	CIRCULAR	POLYVINYL CHLORIDE

Lining	Pipe	Total	Surveyed	Laid	Video
NOT SPECIFIED	6.0	29.0	29.0	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location		
DRY	FIELDS ,-		0027

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	29.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	29.00	0.0	0.0	0.0	0.0	60.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

10	0.0	ST	Start Of Survey,	
10	0.0	MH	Manhole, SQ87352001	
10	0.0	WL	Water Level, 10%	
10	0.0	S1 DEG	Debris Grease, at 4 to 5o/c, 5%	
10	0.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	6.0	WL	Water Level, 15%	
	17.4	LL	Line Left, SLIGHT	
	17.4	WL	Water Level, 10%	
	29.0	F1 DEG	Debris Grease, at 4 to 5o/c, 5%	
	29.0	F2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	29.0	MH	Manhole, SQ87351003	
11	29.0	FH	Finished Survey,	

Report : ENGLISH Page : 034 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
28	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87352001X

Date	Time	Location
21/03/2006	15:04	MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87352001	0.00	0.000	0.000	SQ87352002	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	10.9	10.9	Z	00002	

VT	Machine	Comments	Purpose	Cat	Pre
SONY	DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location		
DRY	FIELDS	,-	0028

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	10.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	9.90	1.0	0.0	0.0	0.0	23.0	3.0	2.1

Extra Data - Structural override
User remarks Service override

Detail

11	0.0		ST	Start Of Survey,
11	0.0		MH	Manhole, SQ87352001
11	0.0		WL	Water Level, 10%
11	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
11	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	4.6		ELJ	Encrustation Light At Joint, at 2 to 5o/c,
	10.9	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	10.9	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	10.9		MH	Manhole, SQ87352002
12	10.9		FH	Finished Survey,

Report : ENGLISH Page : 035 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
29	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87352002X

Date Time Location
21/03/2006 15:10 FIELDS OFF MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87352002	0.00	0.000	0.000	SQ87353001	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	91.0	91.0	Z	00002

VT	Machine	Comments	Purpose	Cat	Pre
SONY	DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY FIELDS ,- 0029

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	91.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	91.00	0.0	0.0	0.0	0.0	184.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

12	0.0	ST	Start Of Survey,	
12	0.0	MH	Manhole, SQ87352002	
12	0.0	WL	Water Level, 10%	
12	0.0	S1 DEG	Debris Grease, at 4 to 5o/c, 5%	
12	0.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	1.0	WL	Water Level, 15%	
	3.8	WL	Water Level, 10%	
	10.7	WL	Water Level, 15%	
	13.4	WL	Water Level, 10%	
	22.5	WL	Water Level, 15%	
	27.0	WL	Water Level, 10%	
	30.6	WL	Water Level, 15%	
	35.7	WL	Water Level, 10%	
	50.9	GO	General Observation, CHIPPED JOINT	
	52.6	WL	Water Level, 15%	
	54.2	WL	Water Level, 10%	
	61.0	WL	Water Level, 15%	
	64.5	WL	Water Level, 10%	
	73.7	WL	Water Level, 15%	
	76.5	WL	Water Level, 10%	
	91.0	F1 DEG	Debris Grease, at 4 to 5o/c, 5%	
	91.0	F2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	91.0	MH	Manhole, SQ87353001	
13	91.0	FH	Finished Survey,	

Report : ENGLISH Page : 036 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
30	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87353001X

Date	Time	Location
21/03/2006	15:20	FIELDS OFF MEADOW LANE , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87353001	0.00	0.000	0.000	SQ87354001	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	84.8	Z		00002

VT	Machine	Comments	Purpose	Cat	Pre
SONY DVD		SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location		
DRY	FIELDS	,-	0030

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	77.80	2.0	5.0	0.0	0.0	57.0	39.0	0.7
Service	83.80	1.0	0.0	0.0	0.0	172.0	3.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

13	0.0		ST	Start Of Survey,
13	0.0		MH	Manhole, SQ87353001
13	0.0		WL	Water Level, 10%
13	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
13	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	0.7		EL	Encrustation Light, at 8 to 4o/c,
	10.1		CC	Crack Circumferential, at 8 to 4o/c,
	17.0		FC	Fracture Circumferential, at 1 to 5o/c,
	17.0		FL	Fracture Longitudinal, at 3o/c,
	17.0		FC	Fracture Circumferential, at 7 to 11o/c,
	17.0		FC	Fracture Circumferential, at 8 to 9o/c,
	54.8		RFJ	Roots Fine At Joint,
	80.5		CL	Crack Longitudinal, at 9o/c,
	80.5		FL	Fracture Longitudinal, at 2o/c,
	84.8	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	84.8	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
15	84.8		SA	Survey Abandoned, EXTENT OF CABLE

Report : ENGLISH Page : 037 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
31	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87358102X

Date	Time	Location
21/03/2006	15:37	ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87358102	0.00	0.000	0.000	SQ87358101	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	9.3	Z		00002

VT	Machine	Comments	Purpose	Cat	Pre
SONY	DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location								
DRY	FOOTPATH/VERGE ,-							0031	

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	9.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	9.30	0.0	0.0	0.0	0.0	24.0	4.0	2.4

Extra Data - Structural override
User remarks Service override

Detail

14	0.0	ST	Start Of Survey,	
14	0.0	MH	Manhole, SQ87358102	
14	0.0	WL	Water Level, 20%	
14	0.0	S1 DEG	Debris Grease, at 7 to 5o/c, 5%	
14	0.0	S2 DES	Debris Silt, 5%	
	6.0	WL	Water Level, 30%	
	7.0	DEG	Debris Grease, at 8 to 4o/c, 10%	
	7.9	WL	Water Level, 50%	
	8.6	WL	Water Level, 60%	
	9.3	DE	Debris, 20%	
	9.3	F1 DEG	Debris Grease, at 7 to 5o/c, 5%	
	9.3	F2 DES	Debris Silt, 5%	
15	9.3	SA	Survey Abandoned, DUE TO DEBRIS IN PIPE	

Report : ENGLISH Page : 038 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
32	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87357101X

Date	Time	Location
21/03/2006	16:06	ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87358102	0.00	0.000	0.000	SQ87357101	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	2.3	Z		00002

VT	Machine	Comments	Purpose	Cat	Pre
	SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	FOOTPATH/VERGE ,-	0032

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	2.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	2.30	0.0	0.0	0.0	0.0	11.0	7.0	3.7

Extra Data - Structural override
User remarks Service override

Detail

15	0.0	ST	Start Of Survey,	
15	0.0	MH	Manhole, SQ87358102	
15	0.0	WL	Water Level, 50%	
15	0.0	S1 DEG	Debris Grease, at 9 to 3o/c, 15%	
	1.2	DEG	Debris Grease, at 9 to 3o/c, 30%	
	2.3	F1 DEG	Debris Grease, at 9 to 3o/c, 15%	
16	2.3	SA	Survey Abandoned, DUE TO GREASE IN PIPE	

Report : ENGLISH Page : 039 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
33	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87358101X

Date Time Location
21/03/2006 16:15 ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87359001	0.00	0.000	0.000	SQ87358101	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	81.4	81.4	Z	00002

VT Machine Comments Purpose Cat Pre
SONY DVD SURVEY OF EXISTING FOUL SEWER.. STRUCTURAL/SERVICE B -
Weather Location
DRY FOOTPATH/VERGE ,- 0033

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	81.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	81.40	0.0	0.0	0.0	0.0	180.0	5.0	2.2

Extra Data - Structural override
User remarks Service override

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

16	0.0		ST	Start Of Survey,		
16	0.0		MH	Manhole, SQ87359001		
16	0.0		WL	Water Level, 30%		
16	0.0	S1	DEG	Debris Grease, at 2 to 3o/c, 5%		
16	0.0	S2	DEG	Debris Grease, at 8 to 9o/c, 5%		
	4.0	C1	DEG	Debris Grease, at 8 to 4o/c, 5%		
	4.0	F2	DEG	Debris Grease, at 8 to 9o/c, 5%		
	11.3		WL	Water Level, 25%		
	15.4	C1	DEG	Debris Grease, at 2 to 4o/c, 5%		
	15.4	S3	DEG	Debris Grease, at 7 to 9o/c, 5%		
	18.0	C1	DEG	Debris Grease, at 3 to 5o/c, 5%		
	22.3		DE	Debris, 10%		
	32.9		DE	Debris, 10%		
	33.9		DE	Debris, 10%		
	37.0		WL	Water Level, 20%		
	41.0		WL	Water Level, 25%		
	44.0		WL	Water Level, 30%		
	47.0		WL	Water Level, 35%		
	49.3		DE	Debris, 10%		
	50.3		DE	Debris, 10%		
	51.5		WL	Water Level, 20%		
	57.6		WL	Water Level, 25%		
	59.0		WL	Water Level, 30%		
	59.0	S4	DEG	Debris Grease, at 11 to 1o/c, 5%		
	68.7		DE	Debris, 15%		
	68.7	F4	DEG	Debris Grease, at 11 to 1o/c, 5%		
	76.6		DE	Debris, 10%		
	79.0		DE	Debris, 10%		
	80.0		WL	Water Level, 25%		
	81.4	F1	DEG	Debris Grease, at 3 to 5o/c, 5%		
	81.4	F3	DEG	Debris Grease, at 7 to 9o/c, 5%		

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Report : ENGLISH Page : 040 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

33 Plr SQ87358101X Dir UPSTREAM Date 21/03/2006 Time 16:15
Location: ROAD TO TREATMENT PLANT , BALLYDUFF

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

	81.4	MH	Manhole, SQ87358101
17	81.4	FH	Finished Survey,

Report : ENGLISH Page : 041 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
34	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ87359001X

Date Time Location
21/03/2006 16:26 ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ87359001	0.00	0.000	0.000	SQ88350002	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	90.8	90.8	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY FOOTPATH/VERGE ,- 0034

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	90.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	87.80	1.0	0.0	0.0	2.0	289.0	9.0	3.2

Extra Data - Structural override
User remarks Service override

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

17	0.0	ST	Start Of Survey,
17	0.0	MH	Manhole, SQ87359001
17	0.0	WL	Water Level, 20%
	0.7	RFJ	Roots Fine At Joint,
	0.7 S1	DES	Debris Silt, 5%
	1.4	RMJ	Roots Mass At Joint, 15%
	1.4 S2	DEG	Debris Grease, at 4 to 5o/c, 5%
	1.4 S3	DEG	Debris Grease, at 7 to 8o/c, 5%
	4.0 C1	DES	Debris Silt, 10%
	7.6 F1	DES	Debris Silt, 10%
	8.0	WL	Water Level, 10%
	10.7	WL	Water Level, 15%
	12.9 S4	DES	Debris Silt, 5%
	13.0	WL	Water Level, 20%
	16.7	WL	Water Level, 25%
	19.6	RMJ	Roots Mass At Joint, 10%
	20.4	WL	Water Level, 30%
	20.4	DE	Debris, 20%
	21.4 C4	DES	Debris Silt, 10%
	23.0	WL	Water Level, 15%
	24.0	WL	Water Level, 20%
	26.5	WL	Water Level, 25%
	29.3	DE	Debris, 25%
	30.5	WL	Water Level, 15%
	30.5 F4	DES	Debris Silt, 10%
	36.6 S5	DES	Debris Silt, 5%
	39.5	EL	Encrustation Light, at 9 to 3o/c,
	43.0	WL	Water Level, 10%
	45.2	WL	Water Level, 15%
	47.3	WL	Water Level, 10%
	50.0	WL	Water Level, 15%

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34 Plr SQ87359001X Dir DOWNSTREAM Date 21/03/2006 Time 16:26
Location: ROAD TO TREATMENT PLANT , BALLYDUFF

Detail (cont.)

	57.6		WL	Water Level, 10%
	68.8		WL	Water Level, 15%
	79.3		WL	Water Level, 10%
	81.0		WL	Water Level, 15%
	85.0		WL	Water Level, 10%
	90.8	F5	DES	Debris Silt, 5%
	90.8	F3	DEG	Debris Grease, at 7 to 8o/c, 5%
	90.8	F2	DEG	Debris Grease, at 4 to 5o/c, 5%
	90.8		MH	Manhole, SQ88350002
18	90.8		FH	Finished Survey,

Report : ENGLISH Page : 043 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
35	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ88350002X

Date Time Location
21/03/2006 16:45 ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ88350002	0.00	0.000	0.000	SQ88350001	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	91.0	91.0	Z	00002

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY FOOTPATH/VERGE ,- 0035

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	87.00	0.0	2.0	2.0	0.0	83.0	83.0	0.9
Service	90.00	0.0	0.0	0.0	1.0	283.0	5.0	3.1

Extra Data - Structural override
User remarks Service override

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

18	0.0	ST	Start Of Survey,
18	0.0	MH	Manhole, SQ88350002
18	0.0	WL	Water Level, 15%
18	0.0 S1	DEG	Debris Grease, at 4 to 5o/c, 5%
18	0.0 S2	DEG	Debris Grease, at 7 to 8o/c, 5%
18	0.0 S3	DES	Debris Silt, 10%
	3.0	WL	Water Level, 15%
	3.0 C3	DES	Debris Silt, 5%
	5.6	WL	Water Level, 10%
	7.0	WL	Water Level, 15%
	14.4	WL	Water Level, 10%
	18.6	WL	Water Level, 15%
	23.7	WL	Water Level, 20%
	24.4	DE	Debris, 10%
	29.0	WL	Water Level, 15%
	34.4	WL	Water Level, 10%
	36.7	WL	Water Level, 15%
	40.6	WL	Water Level, 20%
	43.7	CXI	Connection Defective/Intruding, 100mm at 12o/c, Int.40mm
	43.7	B	Broken Pipe, at 10 to 3o/c,
	43.7	FL	Fracture Longitudinal, at 11o/c,
	43.7	FC	Fracture Circumferential, at 11 to 1o/c,
	43.7	RM	Roots Mass, 15%
	43.7	WL	Water Level, 15%
	46.5	WL	Water Level, 20%
	50.0	WL	Water Level, 25%
	52.0	WL	Water Level, 15%
	53.0	WL	Water Level, 10%
	55.0	WL	Water Level, 20%
	58.0	WL	Water Level, 25%
	60.0	WL	Water Level, 20%

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35 Plr SQ88350002X Dir DOWNSTREAM Date 21/03/2006 Time 16:45
Location: ROAD TO TREATMENT PLANT , BALLYDUFF

Detail (cont.)

	61.6		WL	Water Level, 15%
	70.0		WL	Water Level, 15%
	79.8		CN	Connection, 100mm at 12o/c,
	87.2		WL	Water Level, 20%
	91.0	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	91.0	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	91.0	F3	DES	Debris Silt, 5%
	91.0		MH	Manhole, SQ88350001
19	91.0		FH	Finished Survey,

Report : ENGLISH Page : 045 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
36	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ88350001X

Date	Time	Location
21/03/2006	16:58	ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ88350001	0.00	0.000	0.000	SQ88351001	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	90.7	90.7	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location	
DRY	FOOTPATH/VERGE ,-	0036

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	90.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	90.70	0.0	0.0	0.0	0.0	182.0	2.0	2.0

Extra Data - Structural override
User remarks Service override

Detail

1	0.0		ST	Start Of Survey,
1	0.0		MH	Manhole, SQ88350001
1	0.0		WL	Water Level, 15%
1	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
1	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	3.3		WL	Water Level, 10%
	24.7		WL	Water Level, 15%
	26.0		WL	Water Level, 10%
	34.5		WL	Water Level, 15%
	36.0		WL	Water Level, 10%
	40.8		WL	Water Level, 15%
	42.5		WL	Water Level, 10%
	90.7	F1	DEG	Debris Grease, at 4 to 5o/c, 5%
	90.7	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	90.7		MH	Manhole, SQ88351001
2	90.7		FH	Finished Survey,

Report : ENGLISH Page : 046 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
37	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ88351001X

Date	Time	Location
21/03/2006	17:33	ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ88351001	0.00	0.000	0.000	SQ88342901	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	91.6	91.6	Z	00003

VT Machine	Comments	Purpose	Cat	Pre
SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location
DRY	FOOTPATH/VERGE ,-

0037

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	91.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	91.60	0.0	0.0	0.0	0.0	204.0	6.0	2.2

Extra Data - Structural override
User remarks Service override

Detail

2	0.0		ST	Start Of Survey,
2	0.0		MH	Manhole, SQ88351001
2	0.0		WL	Water Level, 15%
2	0.0	S1	DEG	Debris Grease, at 4 to 5o/c, 5%
2	0.0	S2	DEG	Debris Grease, at 7 to 8o/c, 5%
	10.0		WL	Water Level, 10%
	15.2		WL	Water Level, 15%
	18.3		WL	Water Level, 10%
	23.5		WL	Water Level, 15%
	26.6		WL	Water Level, 10%
	30.6		WL	Water Level, 15%
	31.4		WL	Water Level, 20%
	31.4	S3	DES	Debris Silt, 5%
	33.0	C3	DES	Debris Silt, 5%
	34.6		DE	Debris, 15%
	36.0		WL	Water Level, 15%
	36.0	C3	DES	Debris Silt, 5%
	37.0	F3	DES	Debris Silt, 5%
	54.6		CN	Connection, 100mm at 12o/c,
	58.0		WL	Water Level, 10%
	59.3		WL	Water Level, 15%
	60.2		WL	Water Level, 10%
	66.4		WL	Water Level, 15%
	69.4		WL	Water Level, 10%
	72.0		WL	Water Level, 15%
	76.0		WL	Water Level, 10%
	84.0		WL	Water Level, 15%
	84.0	S4	DES	Debris Silt, 5%
	91.6	F4	DES	Debris Silt, 5%
	91.6	F2	DEG	Debris Grease, at 7 to 8o/c, 5%
	91.6	F1	DEG	Debris Grease, at 4 to 5o/c, 5%

continued..----

37 Plr SQ88351001X Dir DOWNSTREAM Date 21/03/2006 Time 17:33
Location: ROAD TO TREATMENT PLANT , BALLYDUFF

Detail (cont.)

	91.6	MH	Manhole, SQ88342901
3	91.6	FH	Finished Survey,

Report : ENGLISH Page : 048 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
38	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ88342901X

Date	Time	Location
21/03/2006	18:09	ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ88342901	0.00	0.000	0.000	SQ88343901	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	54.0	54.0	Z	00003

VT	Machine	Comments	Purpose	Cat	Pre
	SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location		
DRY	GARDENS	,-	0038

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	54.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	54.00	0.0	0.0	0.0	0.0	110.0	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, SQ88342901	
3	0.0	WL	Water Level, 10%	
3	0.0	S1 DEG	Debris Grease, at 4 to 5o/c, 5%	
3	0.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	54.0	F1 DEG	Debris Grease, at 4 to 5o/c, 5%	
	54.0	F2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	54.0	MH	Manhole, SQ88343901	
4	54.0	FH	Finished Survey,	

Report : ENGLISH Page : 049 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
39	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ88343901X

Date Time Location
21/03/2006 18:19 ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ88343901	0.00	0.000	0.000	SQ88343902	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	71.0	71.0	Z		00003

VT	Machine	Comments	Purpose	Cat	Pre
SONY	DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather Location
DRY FIELDS ,- 0039

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	71.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	71.00	0.0	0.0	0.0	0.0	73.0	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, SQ88343901	
4	0.0	WL	Water Level, 10%	
4	0.0 S1	DEG	Debris Grease, at 7 to 5o/c, 5%	
	65.0	DE	Debris, 5%	
	71.0 F1	DEG	Debris Grease, at 7 to 5o/c, 5%	
	71.0	MH	Manhole, SQ88343902	
5	71.0	FH	Finished Survey,	

Report : ENGLISH Page : 050 Date : 05/05/2006 (09:18)
Database: USA5883 Study: DATABASE Sorted : --Not Sorted--

Id	Surveyor	Contract	Job No.	Catchment	Div	Dist	P. L. Ref
40	USA LTD JS	USA5883	USA5883	BALLYDUFF	0	000	SQ88343902X

Date	Time	Location
21/03/2006	18:26	ROAD TO TREATMENT PLANT , BALLYDUFF

St Manhole	Depth	Cover	Invert	Fh Manhole	Depth	Cover	Invert
SQ88343902	0.00	0.000	0.000	SQ88344801	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	70.7	Z	00003

VT	Machine	Comments	Purpose	Cat	Pre
	SONY DVD	SURVEY OF EXISTING FOUL SEWER..	STRUCTURAL/SERVICE	B	-

Weather	Location			
DRY	FIELDS	,-		0040

(SRM version 2)	1	2	3	4	5	Total	Peak	Mean
Structural	70.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Service	70.70	0.0	0.0	0.0	0.0	108.0	7.0	1.5

Extra Data - Structural override
User remarks Service override

Detail

5	0.0	ST	Start Of Survey,	
5	0.0	MH	Manhole, SQ88343902	
5	0.0	WL	Water Level, 10%	
5	0.0	S1 DEG	Debris Grease, at 7 to 5o/c, 5%	
	30.0	C1 DEG	Debris Grease, at 4 to 5o/c, 5%	
	30.0	S2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	50.0	C1 DEG	Debris Grease, at 7 to 5o/c, 5%	
	50.0	F2 DEG	Debris Grease, at 7 to 8o/c, 5%	
	63.6	C1 DEG	Debris Grease, at 7 to 5o/c, 20%	
	65.8	DEG	Debris Grease, at 7 to 5o/c, 30%	
	66.0	C1 DEG	Debris Grease, at 7 to 5o/c, 30%	
	67.0	C1 DEG	Debris Grease, at 7 to 5o/c, 20%	
	70.7	F1 DEG	Debris Grease, at 7 to 5o/c, 20%	
6	70.7	SA	Survey Abandoned, EXTENT OF CABLE	

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 at A1)

therefore virtually odourless, and capable of supporting aquatic life. The land drain is a relatively inaccessible artificial channel, and not a natural water ecosystem and therefore full environmental concerns are only applicable to the Cashen River.

Alternatively the construction of a new outfall from the treatment plant would allow the effluent to be kept isolated until it reached the Cashen River. This outfall would be 940m long, and would not offer any further treatment to the effluent. The cost of this would be substantial, and is detailed in the cost estimates section.

As such, the discharge to the land drain, as per the existing arrangement, is the preferred discharge method. In order to maintain full control of the land drain, and ensure its appropriate upkeep, it is recommended that Kerry County Council purchase the land drain. This cost has been included for in the scheme cost using the land cost figures provided by Kerry County Council.

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).

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.

Phosphorus

The concentration of Phosphorus in the raw influent should be at most 11 mg/l based on current domestic loadings. Typical effluent from a secondary treatment plant will return a concentration of 8 mg/l or less. Given that the Feale/Cashen can take many multiples of this, it is not proposed to have a standard for Phosphorus for Phase I. However, as the receiving water is classified as sensitive, consideration should be given to adopt an effluent standard of 2 mg/l for Phase II.

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.

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.

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

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 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 2.2 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.	

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

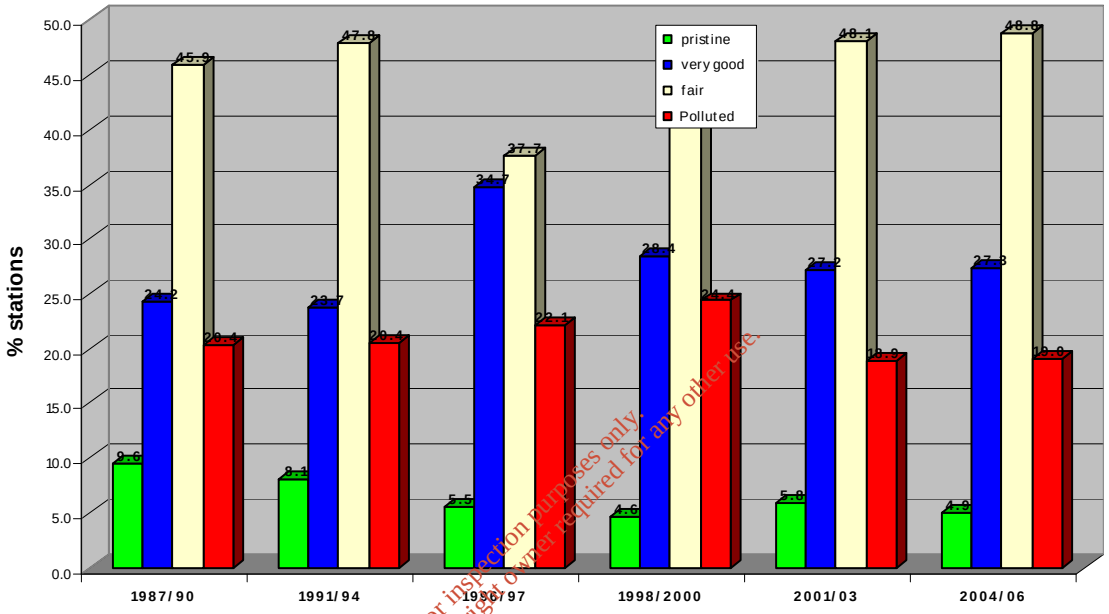

Table a

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.

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

Impact Mitigation.

Discharge Standards

The primary objective in setting an effluent quality standard for Ballyduff 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

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".

In this context "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".

The Cashen Estuary is designated as sensitive under the Third Schedule, however, under article 4.4(b) nutrient reduction is not required if the sanitary authority is satisfied that such reduction will have no effect on the level of eutrophication in the receiving waters.

Quality of Salmonid Waters

The Cashen/Feale Estuary has been included in Schedule 1 of the European Communities (Quality of Salmonid Waters) Regulations, S.I. 293/88 and is therefore designated as a salmonid water. 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 1 European Communities (Quality of Salmonid Waters) Regulations, S.I. 293/88

Parameter	Value	Unit
Dissolved Oxygen	50% ≥ 9	mg/l O2
pH	≥6 ≤ 9	
Total Suspended Solids	≤ 25	mg/l
BOD5	≤ 5	mg/l O2
Nitrite	≤ 0.05	mg/l NO2
Un-Ionised Ammonia	≤ 0.02	mg/l NH3
Total Ammonia	≤ 1	mg/l NH4+

Discharge Specification

BOD
The concentration of raw influent to the Ballyduff treatment plant should be in the range 95 – 300 mg/l. The Feale/Cashen River has the waste assimilative capacity to deal with multiples of this figure. However, as the Phase II population is approaching 2000 p.e., secondary treatment would deemed necessary at Ballyduff at that stage. It is therefore proposed to have a limited Phase I effluent BOD standard, but to adopt a full effluent BOD standard of 25 mg/l for Phase II.

Phosphorus
The concentration of Phosphorus in the raw influent should be at most 11 mg/l based on current domestic loadings. Typical effluent from a secondary treatment plant will return a concentration of 8 mg/l or less. Given that the Feale/Cashen can take many multiples of this, it is not proposed to have a standard for Phosphorus for Phase I. However, as the receiving water is classified as sensitive, consideration should be given to adopt an effluent standard of 2 mg/l for Phase II.

Total Ammonia
The concentration of Nitrogen in the raw effluent should be in the range 40 – 50 mg/l. As stated previously, the Feale/Cashen River has the waste assimilative capacity to deal with multiples of this figure and therefore, no ammonia standard is proposed.

Table 2 –Discharge Specification

Parameter	Phase I	Phase II
	Discharge Specification (mg/l)	Discharge Specification (mg/l)
BOD	100	25.0
Phosphorus	15	2.0
Total Nitrogen	n/a	n/a

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, however it is likely that developments in Ballyduff will continue in line with what has currently been developed, i.e. small once off housing or medium density developments.

Despite this, it is recommended that a sustainable drainage policy be developed and enforced by Kerry County Council for all new developments within Ballyduff. 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 dwellings should incorporate soak pits for rainwater, primarily as a method of preventing flooding, due to the high volumes of surface water currently entering the public sewer in Ballyduff.

Table 1 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 1336mm. These

catchments characteristics were obtained from the Flood Studies Report, 1975.

A Storm sewer network to collect this permissible runoff has been designed and is shown on Drawing No 20367-BF-13. The design philosophy is detailed in Appendix 3 of the PR.

Table 1 – Permissible Outflow Rate

Soil Class **Soil Index**	**4** **0.45**	
Development Area (ha)	**Permissible Outflow Rate**	
	l/s	**l/s/ha**
0.5	7.77	15.53
1	14.39	14.39
2	26.67	13.33
3	38.36	12.75
4	49.42	12.36
5	60.28	12.06
6	70.90	11.82
7	81.33	11.62
8	91.59	11.45
9	101.71	11.30
10	111.77	11.17

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

Proposed Storm Network

In general, the area within the development boundary slopes downwards towards the east of the town. A local stream was used as discharge points for the surface water. Proposed pipe diameters vary in size from 225mm to 450mm. The proposed storm network layout for Ballyduff are detailed in Drawing Nos. 20367-BF-13.

Any substantial development should have its own surface water drainage system, connected to an individual soak pit as per SUDS, primarily as a method of preventing pollution, as opposed to flooding or watercourse issues. The land drains in the area could be used in conjunction with SUDS as suitable discharge points. This would have the added benefit of diluting the effluent from the treatment plant.
The topography of the village ensures that there should be no risk of flooding to properties. However it is recommended that Kerry County Council develop and enforce a sustainable drainage policy as outlined in Section 2.11. It is also inevitable that a certain amount of surface water could enter the foul network

system, particularly from roofs and yards connected to existing septic tanks. Soak pits should be installed by householders to ensure minimum infiltration of storm water into the foul network.

Foul Sewer Network

In relation to the existing combined system, it is proposed in to replace 1,624m of gravity sewers with a diameter of less than 225mm to a minimum diameter of 225mm. In addition the following rehabilitation works are included as part of the recommended works:-

- Relining of all of the existing network elements that are to be retained (2,334 m of sewer).
- Rehabilitation of 43 manholes.
- Reopening and repair of defective laterals at 35 locations.
- Localised repairs at 25 locations.
- Removal of intrusions at 16 locations.

To accommodate future growth the following extensions to the foul network are proposed:-

- Construction of 585m of 225mm diameter gravity sewer, connecting to the existing network on Main Street, to serve lands zoned for development in Benmore.
- Construction of 225mm diameter gravity sewer, connecting to the existing network on Main Street, to serve lands zoned for development to the north of the village in Knoppoge South and Leagh.
- Construction of 225mm diameter gravity sewer, a pumping station, and 241m of 50mm rising main connecting to the existing network at Bishopscourt South, to serve existing properties on the R551 to the north of the village that currently have private treatment facilities.
- Construction of 225mm diameter gravity sewer, a pumping station, and 736m of 100mm rising main connecting to the existing network Sleepwalk, to serve existing properties on the local road from the village to the south east that currently have private treatment facilities.

The Local Area Plan identifies land to the east of the main street for residential development. This area naturally drains towards the existing treatment plant site. The Local Area Plan proposes that these lands should be developed in conjunction with the construction of a new access road.

Consequently it is proposed that these zoned lands will be serviced via a new gravity sewer connection to the existing gravity system in Lacka East, constructed in conjunction with the access road by the developer(s).

In the interim, if individual pockets of land are developed ahead of the construction of the access road, then the developers may have to construct individual pumping stations and rising main to the public gravity system to service the developments in the short-term.

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.