WASTE WATER DISCHARGE LICENSING
APPROPRIATE ASSESSMENT for D0081-01

1. Introduction

This "appropriate assessment" (AA) is undertaken in accordance with the Wastewater Discharge Authorisation Note on Appropriate Assessments, issued by the EPA. Due regard is given to the EC Guidance "Managing Natura 2000 Sites". In compliance with the requirements of Article 6 of the directive, and following the guidelines, this AA has been structured in stages as set out hereunder:

Stage 1 Screening:

This includes a description of the activity and the discharge; identification of the Natura 2000 sites potentially affected; identification of cumulative impacts on the Natura 2000 site in the vicinity of the discharge; assessment of the significance of the impacts identified on the site integrity

Stage 2 Appropriate Assessment

This includes a description of elements of the Natura 2000 site which will be considered further; a description of significant impacts on the conservation features of the site likely to occur from the discharge; and, recommendations regarding necessary measures to be taken to ensure the protection of the site and its conservation objectives

Stage 3 Assessment of Alternatives

This examines the current provisions regarding the treatment plant and its discharge and future provisions to ensure the ongoing protection of the Natura 2000 site

Stage 4 Assessment where no alternatives exist

This examines reasons (if they exist) of overriding public interest for continuation of a discharge which has a negative impact on the Natura 2000 site.

2. Stage 1 Screening:

Is the Ennistymon WWTP directly connected with or necessary to the management of the site? No

2.1 Description of the treatment plant

The Ennistymon Wastewater Treatment Plant (WWTP) serves a population equivalent of 2,100. Ennistymon is served by a combined sewer system with storm water flow being a significant influence on the hydraulic load in the system during the Winter months. All wastewaters flow through the pump station on the Lahinch road before entering the WWTP at Ennistymon. The pumps operate at a current maximum pumping capacity of approximately 13-17l/s to the wastewater treatment plant equating to between 1123m^3/day – 1469m^3/day maximum inflow to the plant during heavy rainfall events. A full description of the treatment plant and outfall location is set out in the licence application (D0081-01), and shown on Figure 1

2.2 Description of the Natura 2000 site[1]

SITE NAME: INAGH RIVER ESTUARY SITE CODE: 000036

The Inagh River Estuary is an estuarine channel that flows westwards to the sea from Ennistymon, in the northwest of Co. Clare. The site includes the estuaries of both the Inagh and Dealagh Rivers. These channels meander through a wide, flat valley, which is sheltered from the sea by an extensive sand dune system to the west. Low undulating hills surround the valley, giving it a secluded nature. The soils vary from gleys to peats. A diverse mosaic of habitats occurs within the site, ranging from coastal dune system, estuarine channel and its associated saltmarsh habitat, to fresh water and terrestrial habitats further inland. The bulk of the site is made up of low-lying wet grasslands. The site holds examples of five habitat types listed under Annex I of the EU Habitats Directive.

Saltmarsh occurs along the tidal section of the valley. Common species here include a mixture of Plantains (*Plantago maritima*, *P. coronopus*) and Thrift (*Armeria maritima*), with lesser amounts of Sea Milkwort (*Glaux maritima*), Sea Aster (*Aster tripolium*) and Glassworts (*Salicornia* spp.). In places the Glassworts extend out onto the intertidal sands. Owing to golf course development, only a small area of intact sand dune remains within the site. Some Marram (*Ammophila arenaria*) dunes occur at the tip of the sandy peninsula near O'Brien's Bridge. These support species such as Sand Sedge (*Carex arenaria*), Sand Couch (*Elymus farctus*), Red Fescue (*Festuca rubra*) and Sea Sandwort (*Honkenya peploides*). A small area of fixed dunes occurs north of the channel. The nutrient-poor soils here support a diverse flora which

includes Birdsfoot Trefoil (*Lotus corniculatus*), Kidney Vetch (*Anthyllis vulneraria*), Quaking Grass (*Briza media*) and Early Marsh Orchid (*Dactylorhiza incarnata*). Two small areas of deciduous woodland are found further inland towards Ennistimon town. A wet woodland, dominated by Willows (*Salix* spp.) and Downy Birch (*Betula pubescens*), occurs south of the river adjacent to Ivy Cottage. A narrow band of dry deciduous woodland, known as "The Glen", supports a mixture of Ash (*Fraxinus excelsior*) with occasional Oak (*Quercus* sp.) and Elm (*Ulmus* sp.). A scenic waterfall located at Ennistimon town adds to the interest and diversity of the site. An expanse of wet grassland vegetation dominates much of the valley floor supporting an abundant cover of Rushes (*Juncus* spp.), along with lesser amounts of Sedges (*Carex* spp.), Plantains, Clover (*Trifolium* spp.), Buttercups (*Ranunculus* spp.) and Cuckooflower (*Cardamine pratensis*). These grasslands provide ideal feeding and sheltering grounds for wildfowl, and a range of bird species commonly use this area. A small flock of Greenland White-fronted Goose formerly used the site during the winter months. The main waterfowl species now using the area are Wigeon (754), Teal (115), Mallard (67), Oystercatcher (148), Ringed Plover (53 I), Lapwing (657) and Curlew (211) (data for winters 1995/96 to 1997/98). Part of the site has been managed as a Wildfowl Sanctuary since 1989. This is a large site with a range of coastal, tidal and terrestrial habitats that are of considerable ecological interest, five of which are listed under Annex I of the EU Habitats Directive. The extensive and relatively secluded low-lying wet grasslands provide a natural and legally protected refuge for wildfowl.

[1](Site synopsis from www.npws.ie)

2.3 Identification of potential impacts

Only those features of the operation of the wastewater treatment plant or the discharge, which have the potential to impact on interests and conservation objectives of the Inagh River Estuary designated site are considered. A number of factors were examined and then dismissed, or, carried forward for appropriate assessment, as relevant. The main issue examined in relation to potential impact on the designated site was the water quality associated with the area downstream of the discharge from the WWTP.

The potential impacts on the river water quality associated with the wastewater treatment plant are:

- Organic pollution of the river with untreated or poorly treated sewage
- Eutrophication of river water due to elevated phosphorus in the discharge

- Pollution of the river by other pollutants associated with wastewater (organic compounds or heavy metals)

A deterioration of water quality could affect some habitats or species for which the site has been designated. Water quality data is available for Ennistymon Bridge (upstream of the discharge) , bank sample downstream of the Ennistymon falls, and and O'Brien's Bridge (downstream of the discharge) for the period 2001-2004 on a monthly grab sample basis. This data does not indicate any change in water quality status for the Inagh river between the upstream and downstream sampling points. Water quality in the river can be classified as "good" when assessed against the supporting physico-chemical data for high/good status waters set out in the European Communities Environmental Objectives (Surface Water) Regulations 2009. Relevant data from the monitoring events in the period 2001-2004 are attached as Appendix A to this document.

During the preparation of the licence application, sampling was undertaken upstream and downstream of the actual point of discharge (see Table F.1.i.a and b in the application). There is no discernible impact associated with the discharge on water quality downstream of the discharge from the treatment facility, with all parameters measured meeting the physico-chemical conditions supporting high quality status, using the values associated with the European Communities Environmental Objectives (Surface Water) Regulations 2009, Schedule 5, Part A.

Bathing water quality is assessed on a fortnightly basis, during the Bathing water season, by Clare County Council at Lahinch beach, located at the mouth of the Inagh estuary. Monitoring data indicates 100% compliance with the Guide Limit values imposed for Blue Flag Bathing areas (significantly more stringent than the limit values of the Bathing Water Regulations 1992, as amended by the 2008 Regulations).

2.4 Elements of the project which (alone or in combination) with other plans or projects have the potential to have a significant effect on the site.

The arrangement for discharges from the Ennistymon WWTP is via a 12 inch diameter discharge pipe at Grid Reference E112447, N188682 to the Inagh River within the boundary of the Inagh Estuary cSAC (European Site Code 00036). The site has been selected for the conservation of a number of Annex 1 habitats, which range from a coastal dune system, estuarine channel and its associated saltmarsh habitat, to fresh water and terrestrial habitats further inland. The Inagh River Estuary is an estuarine channel that flows westwards to the sea from Ennistymon, in the

southwest of Co. Clare. The site includes the estuaries of both the Inagh and Dealagh Rivers. These channels meander through a wide, flat valley, which is sheltered from the sea by an extensive sand dune system to the west.

This discharge from the Ennistymon WWTP, as described in the licence application D0081-01, constitutes the element of the project which has potential for a significant effect on the adjacent designated site. The discharge normally complies with the requirements of the Urban Waste Water Treatment Regulations 2001 &2004. Other discharges which can be identified as having potential to have a significant effect on the site are marked on Figure 1 , and include

2.4.1 Surface water streams entering the Inagh River downstream of the discharge from the wastewater treatment plant. There are three streams which enter the Inagh River within 5 kilometres of the Ennistymon WWTP discharge

- The stream entering on the southern bank of the river, enters the Inagh river 340 metres downstream of the discharge from the Ennistymon WWTP, flows through the townland of Cloonaveigh. At the upper end of the catchment of this stream, there is a licenced discharge from a small scale wastewater treatment plant. Dispersed rural housing, served by single house WWTPs also located in this catchment. No data on water quality in the stream is available.
- The Ballymacraven River enters the northern bank of Inagh river approximately 100 metres downstream of the discharge from the Ennistymon WWTP. This river receives discharges from the North Clare Regional Water Treatment Plant, at Lickeen Lake. Biological monitoring data for the Calluragh Bridge Station (the nearest bridge upstream of the entry point of the Ballymacraven River to the Inagh River) indicates Q4 rating for the river at this station.
- The stream entering on the northern bank of the river enters the Inagh river 2.5 kilometres metres downstream of the discharge from the Ennistymon WWTP, flows through the townlands of Lisatunna and Knockbrack. The townlands have moderate density single rural houses, served by single house WWTPs. No data on water quality in this stream is available.
- The Dealagh River enters the Inagh river 3.2 kilometres downstream of the discharge from the Ennistymon WWTP. The Cooleen River catchment drains into the Deelagh river just below Kilshanny. Both the Deelagh and Cooleen river catchments are mainly agricultural lands with dispersed rural housing, including holiday homes. Biological quality monitoring has identified moderate status (Q3) for the Deelagh River and good status for the Cooleen river.

2.4.2 Housing developments around Ennistymon and Lahinch, with storm water run off to the river. A biological assessment of water quality for the Inagh river, just upstream of the bridge in Ennistymon indicated a Q4 rating (in 2006) for the river upstream of the town discharges. No biological assessment is available for the monitoring station downstream of the Ennistymon discharge (O'Briensbridge), as this station is subject to significant saline influence and is not suited to the biological assessment methodology. However, physico-chemical monitoring of the O'Briensbridge station indicates low levels of molybdate reactive phosphate (MRP) and ammoniacal nitrogen.

2.4.3. Other discharges to waters in the immediate catchment of Ennistymon will include storm water discharges from the Ennistymon urban area (and associated housing developments) and storm water discharges from the roads network in the immediate catchment.

2.4.4. Other plans and projects considered to have potential to have "in combination" effects are listed hereunder:

- North Clare Development Plan
- Downstream discharges to the Inagh estuary from dispersed rural housing in the Inagh river catchment and its tributaries in the vicinity of the discharge from the Ennistymon WWTP
- Discharge from the Lahinch WWTP
- Deelagh River discharge to the estuary

In so far as the impact of the combined discharges can be assessed by the water quality data recorded between 2001 and 2004, (as provided in Appendix A to this report) there is no evidence of any compromised water quality in the area downstream of the Ennistymon WWTP or in combination with the existing discharges from developments.

2.5 Assessment of Significance of the discharge

The Inagh River Estuary is a designated conservation area on the basis of Annex 1 habitats, providing ideal feeding grounds for several bird species, as described in Section 2.2 above. As there is no evidence of a significant difference in water quality in the area downstream of the discharge from the Ennistymon WWTP, and this water

quality is considered to be in the high/good status range, it is considered that there is no impact associated with the discharge on the designated habitats or the feeding grounds of any birds in the area

Referring to the L8/08 Circular, the following queries are raised and answered:

1. Is the development in or on the boundary of an SAC/NHA etc **Yes**
2. Will nationally protected species be directly impacted? **No**
3. Is the development a surface water discharge or downstream of a conservation site with water dependent qualifying habitats/species **Yes**
4. Is the development a groundwater discharge/abstraction? **No**
5. Is the development in the surface water or groundwater catchment of salmonid waters? **No**
6. Is the treatment plant in an active/former floodplain? **No**
7. Is the development a surface water discharge to/from marine waters and within 3km of a marine conservations site? **No**
8. Will the project in combination with other projects (existing and proposed) or changes to such projects affect the hydrology or water levels of sites of conservation interest or habitats of protected species? **No**

L8/08 states that if the conclusion of the screening process above is to "Assess Impacts" then the project must be referred to the DEHLG Developments Application Unit. As the conclusion of the screening process is that there is no discernable impact, the application has not been referred to the DEHLG Developments Application Unit.

2.6 Conclusion

A screening process was undertaken to determine the potential impact, if any, of the Ennistymon WWTP discharge on the Inagh River Estuary designated site. No impact is considered likely taking account of the quality of the final discharge from the treatment plant (as described in the licence application), and in the quality of the receiving waters upstream and downstream of the discharge (as set out in Appendix A)

3. Stage 2 Appropriate Assessment

3.1 Introduction

The potential impacts resulting from the effluent discharge from the Ennistymon WWTP are discussed in relation to the conservation objectives of the Inagh River Estuary (Site Code 00036) site. A conservation management plan has not yet been published for this site. The general advice from the National Parks and Wildlife Service for those sites which conservation management plan is not prepared is to ensure the features of interest of the site are identified and clear objectives for protection of the status of these features are set out. Any impacts (both positive and negative) on the site needs to be identified , and appropriate management planning needs to be in place to ensure the protection objectives for these sites are met.

3.2 General Description

The Inagh River Estuary SAC covers an area of 394.44 hectares and includes five Annex 1 habitats.

Saltmarsh occurs along the tidal section of the valley. Common species here include a mixture of Plantains (*Plantago maritima*, *P. coronopus*) and Thrift (*Armeria maritima*), with lesser amounts of Sea Milkwort (*Glaux maritima*), Sea Aster (*Aster tripolium*) and Glassworts (*Salicornia* spp.). In places the Glassworts extend out onto the intertidal sands.

Owing to golf course development, only a small area of intact sand dune remains within the site. Some Marram (*Ammophila arenaria*) dunes occur at the tip of the sandy peninsula near O'Brien's Bridge. These support species such as Sand Sedge (*Carex arenaria*), Sand Couch (*Elymus farctus*), Red Fescue (*Festuca rubra*) and Sea Sandwort (*Honkenya peploides*). A small area of fixed dunes occurs north of the channel. The nutrient-poor soils here support a diverse flora which includes Birdsfoot Trefoil (*Lotus corniculatus*), Kidney Vetch (*Anthyllis vulneraria*), Quaking Grass (*Briza media*) and Early Marsh Orchid (*Dactylorhiza incarnata*).

Two small areas of deciduous woodland are found further inland towards Ennistimon town. A wet woodland, dominated by Willows (*Salix* spp.) and Downy Birch (*Betula pubescens*), occurs south of the river adjacent to Ivy Cottage. A narrow band of dry deciduous woodland, known as "The Glen", supports a mixture of Ash (*Fraxinus excelsior*) with occasional Oak (*Quercus* sp.) and Elm (*Ulmus* sp.). A scenic waterfall located at Ennistimon town adds to the interest and diversity of the site. An expanse

of wet grassland vegetation dominates much of the valley floor supporting an abundant cover of Rushes (*Juncus* spp.), along with lesser amounts of Sedges (*Carex* spp.), Plantains, Clover (*Trifolium* spp.), Buttercups (*Ranunculus* spp.) and Cuckooflower (*Cardamine pratensis*). These grasslands provide ideal feeding and sheltering grounds for wildfowl, and a range of bird species commonly use this area. A small flock of Greenland White-fronted Goose formerly used the site during the winter months. The main waterfowl species now using the area are Wigeon (754), Teal (115), Mallard (67), Oystercatcher (148), Ringed Plover (53 I), Lapwing (657) and Curlew (211) (data for winters 1995/96 to 1997/98). Part of the site has been managed as a Wildfowl Sanctuary since 1989. This is a large site with a range of coastal, tidal and terrestrial habitats that are of considerable ecological interest, five of which are listed under Annex I of the EU Habitats Directive. The extensive and relatively secluded low-lying wet grasslands provide a natural and legally protected refuge for wildfowl.

3.3 Water Quality

No aquatic species of qualifying interest are listed for the site. However, it is important that the habitat water quality is maintained to ensure the instream vertebrate community and plant communities, and for fish. This will also ensure the protection of the feeding areas for bird life at the site.

The main consideration regarding the impact of the discharge from the Ennistymon WWTP in relation to protection of the conservation status of this site is to ensure the ongoing diversity of aquatic species and plant communities, by ensuring the quality of the waters in the vicinity of the discharge from the treatment plant. In this regard, the water quality (provide in Appendix A to this report) is assessed against the typical standards of water quality required for the protection of salmonid species. (EC Quality of Salmonid Waters) Regulations 1988. As the water quality meets the requirements for protection of salmonids, and no significant difference in water quality is detectable upstream and downstream of the discharge, it is not considered that the discharge of treated wastewater from the Ennistymon WWTP adversely affects the estuarine habitats, both because of the quality of the discharge and the observed water quality upstream and downstream of the discharge.

3.3 Organic Pollution

When untreated or poorly treated sewage effluent is introduced to a river, living conditions for flora and fauna can be affected. Increased turbidity in the water affects light penetration, which reduces the capacity of the water to support photosynthesizing plants. Settlement of solids on the river bed can give rise to sludge levels which make this area uninhabitable for organisms which would normally dwell in the river bed. Reduced oxygen levels can also have a significant damaging effect for all aquatic species. The data for the discharge from the Ennistymon WWTP (included in the licence application (see Table D.1 (i) (b)) does not indicate that the discharge contains untreated sewage and that the discharge complies with the standards required under the Urban Waste Water Regulations 2001 and 2004. Monitoring data for Inagh River upstream and downstream of the discharge does not indicate any observable impact on water quality in the receiving waters. It is therefore considered that organic pollution is not giving rise to damage to the aquatic habitats.

3.4 Eutrophication

Eutrophication is the enrichement of waters beyond natural levels with the nutrient phosphorus. Eutrophication in aquatic systems results in loss of biodiversity and degradation of aquatic habitats. Standards were set for phosphorus and biological water quality in the Water Quality Standards for Phosphorus Regulations 1998, now replaced by the European Communities Environmental Objectives (Surface Waters) Regulations 2009. A median value of 0.06mg/litre is prescribed for molybdate reactive phosphate (MRP) for transitional waters under these Regulations. The values presenting in the period 2001-2004 inclusive for the waters downstream of the discharge from the Ennistymon WWTP are well within this value.

3.5 Other potential pollutants

A range of organic compounds with the potential to pollute surface waters are present in municipal wastewater from densely populated, industrial agglomerations. The sources of these chemicals are landfills, industrial effluents, medical products and personal hygiene chemicals. When municipal wastewater is treated in a conventional sewage treatment plant the average removal of these compounds is in the range 75-95%. sewage discharges. There is no industrial component or landfill discharge or other source of organic pollution, or heavy metals in the Ennistymon agglomeration.

When discharges from the Ennistymon WWTP were assessed against the limit values provided under the Dangerous Substances Regulations, no exceedence of these limit values was found (See Tables D.1 (i) and (ii) © and Tables F.1.(i) and (ii) (b) in the application)

3.6 Estimated impact of wastewater discharges from Ennistymon WWTP on receiving water quality

The following is a summary of the molybdate reactive phosphate (MRP), biochemical oxygen demand (BOD) and ammoniacal nitrogen (NH_3-N) results for samples taken of the Inagh river upstream and downstream of the Ennistymon WWTP discharge between 2001-2004. After 2004, biological monitoring of the waters was undertaken for the Ennistymon Bridge station only, as biological assessment was not a viable monitoring tool for the O'Briens Bridge station.

Parameter	Sampling location	No of samples	Mean	Median	Max[1]	Limit value[2]
BOD (mg/l)	Upstream	36	2.25	2	6	<4
	Downstream	36	2.3	2	3	
MRP	Upstream	33	0.02	0.01	0.05	<0.04 (mean)
	Downstream	33	0.024	0.01	0.10	<0.06 (median)
NH_3-N	Upstream	35	0.04	0.03	0.09	<0.065
	Downstream	35	0.045	0.03	0.15	

Note 1: Maxima occurred on the same dates upstream and downstream

Note 2: As set out in European Communities Environmental Objectives (Surface Waters) Regulations 2009, using mean limit values for transitional water bodies

It should be noted that the downstream station also takes account of the discharges from the Lahinch agglomeration, as there is no safe accessible water sampling station downstream of the Ennistymon WWTP discharge.

Impacts on water quality in the Inagh river(noted in the data above) by pollution sources upstream of the designated area are taken into account and have been investigated. However, no detectable impact on overall water quality is noted

between the samples taken upstream and downstream of the discharges from the WWTP.

It is concluded that the discharge from the agglomeration of Ennistymon is not having a significant impact, (either in isolation or on a cumulative basis) , on water quality in the Inagh River Estuary designated site area. This includes an impact on Annex 1 habitats and on the feeding grounds of birds associated with the site, and on the conservation objectives of the site.

3.6 Analysis of in combination effects

The discharges from the Ennistymon and Lahinch WWTPs, the influent streams as listed in Section 2.4 of this report (including the Dealagh river), and the diffuse discharges arising from the catchment of the designated site are taken into account in the assessment of water quality at the upstream (Ennistymon bridge) and downstream (O'Briens Bridge) river monitoring stations. The study of water quality data, as provided in Section 3.6 of this report, and the extended data provided in Appendix A indicates that the operation of the Ennistymon WWTP is not having any adverse impact on water quality in the designated site, or any adverse impact on the conservation status of the site

3.7 Mitigation Measures

The principal mitigation measure set out in the application is the ongoing management of the Ennistymon WWTP to ensure compliance with the Urban Waste Water Regulations. The full description of the treatment works is provided in the licence application. Upgrading works were undertaken on this plant in 2006, to address the increasing load from the agglomeration, particularly during the Summer peak flow periods.

The installation of nutrient reduction to ensure low MRP levels in the final discharge can be included as an additional mitigation measure if required. However, no observation of levels of elevated MRP in the waters has been noted.

No other mitigation measures are being considered at this time. It is not considered that the treated discharge will have an impact on the conservation objectives of the designated area.

4. Stage 3 Alternatives

The long term works program for the discharge of treated wastewater from this agglomeration has been described in the main body of the application. The timing of the works will be determined by a priority assessment of needs in the county overall, and will take account of the current financial climate. As the existing treatment plant has been upgraded to provide the necessary treatment for the existing population equivalent, there is unlikely to be a significant investment in the system in the short to medium term period.

5. Stage 4 Imperative Reasons of Overriding Public Interest

1. Are there imperative reasons of overriding public interest? **No**
2. Are there human health or safety considerations or important environmental benefits? **No**

Date	Sampling point	BOD	NH3-N	NO3-N	NO2-N	MRP	pH
30/01/2001	U/S Ennistymon	<2	<0.03		0.7	0.01	7.5
	D/S Falls Ennistymon	<2	<0.03		0.7	0.03	7.5
	O'Briens Bridge	<2	<0.03		0.6	0.04	7.6
22/02/2001	U/S Ennistymon	<2	<0.03		0.8	0.04	
	D/S Falls Ennistymon	<2	<0.03		1.1	0.09	7.9
	O'Briens Bridge	<2	<0.03		0.6	0.04	7.1
28/03/2001	U/S Ennistymon	2	<0.03		0.8	<0.01	7.1
	D/S Falls Ennistymon	3	<0.03		0.8	<0.01	7.1
	O'Briens Bridge	3	<0.03		0.1	<0.01	7.8
25/04/2001	U/S Ennistymon	<2	0.03		0.9		7.7
	D/S Falls Ennistymon	<2	0.03		0.8		7.8
	O'Briens Bridge	<2	0.03		0.4		7.9
31/05/2001	U/S Ennistymon	2	<0.03		0.6	<0.01	8
	D/S Falls Ennistymon	2	<0.03		0.6	<0.01	8
	O'Briens Bridge	2	<0.03		0.7	0.03	8
28/06/2001	U/S Ennistymon	<2			0.8	0.05	7.9
	D/S Falls Ennistymon	<2			0.9	0.03	7.8
	O'Briens Bridge	2			0.3	0.04	8.1
01/08/2001	U/S Ennistymon	<2	<0.03		0.6		7.5
	D/S Falls Ennistymon	<2	<0.03		0.6		7.7
	O'Briens Bridge	4	<0.03		0.5		7.8
19/09/2001	U/S Ennistymon	<2	<0.03		0.5		7.9
	D/S Falls Ennistymon	<2	<0.03		0.7		7.9
	O'Briens Bridge	<2	<0.03		1.1		8
12/10/2001	U/S Ennistymon	<2	0.04		0.8	0.04	7.5
	D/S Falls Ennistymon	<2	0.03		0.8	0.08	7.4
	O'Briens Bridge	<2	0.03		0.7	0.1	7.5
01/11/2001	U/S Ennistymon	2	<0.03		2.5	0.02	7.2
	D/S Falls Ennistymon	3	<0.03		2.4	0.04	7.4
	O'Briens Bridge	3	<0.03		1.8	0.08	7.2
22/11/2001	U/S Ennistymon	3	<0.03		2	0.04	7.1
	D/S Falls Ennistymon	2	<0.03		1.4	0.04	7.3
	O'Briens Bridge	3	<0.03		3.6	0.04	7.3
12/12/2001	U/S Ennistymon	<2	<0.03		4	0.01	7.4
	D/S Falls Ennistymon	<2	<0.03		3.1	0.01	7.3
	O'Briens Bridge	<2	<0.03		5.8	0.01	7.5
29/01/2003	U/S Ennistymon	<2	0.04	0.1	<0.001	0.03	7.6
	D/S Falls Ennistymon	<2	0.04	0.3	<0.001	0.03	7.7
	O'Briens Bridge	<2	0.04	0.1	<0.001	<0.01	7.6
25/02/2003	U/S Ennistymon	<2	0.03	0.7	0.004	0.02	7.6
	D/S Falls Ennistymon	<2	0.06	0.6	0.009	<0.01	7.8
	O'Briens Bridge	3	0.02	0.2	0.013	<0.01	7.8
27/03/2003	U/S Ennistymon	<2	0.03	0.3	<0.001	<0.01	7.9
	D/S Falls Ennistymon	2	0.03	0.1	<0.001	<0.01	8.2
	O'Briens Bridge	2	0.03	<0.1	0.005	<0.01	8.1
24/04/2003	U/S Ennistymon	2	0.03	0.1	<0.001	<0.01	7.8
	D/S Falls Ennistymon	2	0.03	0.1	0.007	<0.01	7.9
	O'Briens Bridge	3	0.06	<0.1	0.012	<0.01	8
22/05/2003	U/S Ennistymon	4	0.07	<0.1	<0.001	0.02	7.1
	D/S Falls Ennistymon	4	0.07	<0.1	<0.001	0.01	7.4
	O'Briens Bridge	3	0.07	<0.1	<0.001	<0.01	7.6
19/06/2003	U/S Ennistymon	<2	<0.03	0.1	<0.001	<0.01	7.7
	D/S Falls Ennistymon	<2	<0.03	<0.1	<0.001	<0.01	7.9
	O'Briens Bridge	<2	<0.03	0.2	<0.001	<0.01	8.1

Date	Sampling point	BOD	NH3-N	NO3-N	NO2-N	MRP	pH
17/07/2003	U/S Ennistymon	6	0.09	0.2	0.01	0.11	7.3
	D/S Falls Ennistymon	6	0.1	0.2	0.01	0.11	7.4
	O'Briens Bridge	3	0.15	<0.1	0.009	0.08	7.6
14/08/2003	U/S Ennistymon	<2	0.05	0.2	<0.001	<0.01	7.8
	D/S Falls Ennistymon	<2	0.05	0.2	<0.001	<0.01	7.8
	O'Briens Bridge	2	0.04	0.2	<0.001	<0.01	7.5
11/09/2003	U/S Ennistymon	2	0.03	0.1	<0.001	<0.01	7.8
	D/S Falls Ennistymon	3	0.29	0.2	0.056	0.06	7.7
	O'Briens Bridge	<2	0.03	<0.1	<0.001	<0.01	8.1
09/10/2003	U/S Ennistymon	<2	0.04	0.1	<0.001	<0.01	7.8
	D/S Falls Ennistymon	<2	0.04	<0.1	0.001	<0.01	7.9
	O'Briens Bridge	<2	0.09	<0.1	0.006	<0.01	7.9
06/11/2003	U/S Ennistymon	3	0.04	0.1	<0.001	<0.01	7.1
	D/S Falls Ennistymon	3	0.07	0.3	<0.001	<0.01	7.4
	O'Briens Bridge	2	0.07	0.2	<0.001	0.03	7.4
03/12/2003	U/S Ennistymon	<2	0.05	0.3	<0.001	<0.01	7.1
	D/S Falls Ennistymon	<2	0.05	0.36	0.002	<0.01	7.1
	O'Briens Bridge	<2	0.06	0.24	0.002	<0.01	7.3
28/01/2004	U/S Ennistymon	<2	0.01	0.1	<0.001	<0.01	7.4
	D/S Falls Ennistymon	<2	0.01	0.2	0.002	<0.01	7.5
	O'Briens Bridge	<2	0.02	<0.1	<0.001	<0.01	7.9
25/02/2004	U/S Ennistymon	2	0.07	0.2	<0.001	0.02	7.6
	D/S Falls Ennistymon	2	0.07	0.2	0.001	0.02	7.7
	O'Briens Bridge	2	0.07	<0.1	0.007	0.01	7.8
25/03/2004	U/S Ennistymon	<2	0.05	<0.1	<0.001	0.03	7.3
	D/S Falls Ennistymon	3	0.07	<0.1	<0.001	0.04	7.4
	O'Briens Bridge	<2	0.08	0.1	0.001	0.03	7.8
21/04/2004	U/S Ennistymon	<2	0.08	<0.1	0.002	0.02	7.2
	D/S Falls Ennistymon	2	0.13	0.19	0.008	0.05	7.4
	O'Briens Bridge	<2	0.07	0.35	0.005	0.01	7.9
19/05/2004	U/S Ennistymon	2	0.03	0.14	<0.001	<0.01	7.5
	D/S Falls Ennistymon	2	0.03	0.24	<0.001	<0.01	7.9
	O'Briens Bridge	2	0.03	0.49	0.001	0.01	8
16/06/2004	U/S Ennistymon	<2	0.02	0.21	<0.001	0.01	7.5
	D/S Falls Ennistymon	7	0.07	0.23	<0.001	0.01	8
	O'Briens Bridge	2	0.01	0.22	0.001	0.01	8.2
20/07/2004	U/S Ennistymon	<2	0.03	0.1	<0.001	0.01	7.6
	D/S Falls Ennistymon	<2	0.03	0.23	<0.001	0.02	7.8
	O'Briens Bridge	2	0.03	0.41	0.001	0.01	8
24/08/2004	U/S Ennistymon	3	0.03	<0.1	<0.001	<0.01	7.4
	D/S Falls Ennistymon	3	0.03	<0.1	0.008	<0.01	7.6
	O'Briens Bridge	3	0.05	<0.01	0.001	0.02	7.9
22/09/2004	U/S Ennistymon	<2	0.03	0.1	<0.001	<0.01	7
	D/S Falls Ennistymon	<2	0.03	<0.1	<0.001	<0.01	7.1
	O'Briens Bridge	2	0.04	<0.1	0.001	0.02	7.3
20/10/2004	U/S Ennistymon	<2	0.05	<0.1	<0.001	0.02	7.1
	D/S Falls Ennistymon	<2	0.04	<0.1	<0.001	0.03	7
	O'Briens Bridge	2	0.04	0.1	0.001	0.03	7.1
17/11/2004	U/S Ennistymon	2	0.07	<0.1	0.007	<0.01	7.6
	D/S Falls Ennistymon	<2	0.06	<0.1	<0.001	<0.01	7.7
	O'Briens Bridge	<2	0.06	0.1	0.001	0.01	7.7
14/12/2004	U/S Ennistymon	2	0.06	<0.1	0.021	0.021	7.2
	D/S Falls Ennistymon	2	0.06	<0.1	<0.001	0.028	7.3
	O'Briens Bridge	<2	0.06	0.1	0.001	0.017	7.5

Figure 1: Ennistymon Wastewater Treatment Plant Discharge Location