

Comhairle Contae Chorcaí Cork County Council

County Hall,
Cork, Ireland.
Tel: (021) 4276891 • Fax: (021) 4276321
Web: www.corkcoco.ie
Halla an Chontae,
Corcaigh, Éire.
Fón: (021) 4276891 • Faics: (021) 4276321
Suíomh Gréasáin: www.corkcoco.ie



Environmental Protection Agency,
Office of Climate change and resource Unit,
Licencing Unit ,
P.O.Box 3000,
Johnstown Castle Estate,
County Wexford.

Environmental Protection Agency Licencing
Received
22 JUN 2009
Initials _____

Our Ref.: MS/MOL/0609

15th June 2009

Sub.: Waste Water Discharge License Application for the Agglomeration of Mogeely, County Cork.

Dear Sir/Madam,

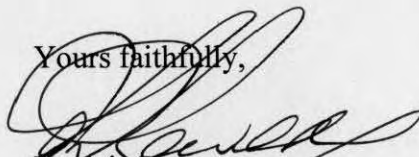
Please find enclosed the waste water discharge license application for the agglomeration of Mogeely.

The following are the documents enclosed as per the application guide note.

- 1 No. signed hard copies of Originals.
- 1 No. hard copy of Originals.
- 2 No. CD-ROM with documentation in electronic searchable PDF,
- 1 No. CD-ROM with GIS Data, Table D.2 ,Table E.3.and Table F.2

The content of the electronic files is true copy of the original hard copy.

Yours faithfully,


Patricia Power
Director of Services



**CORK COUNTY COUNCIL
(Southern Division)**

**APPLICATION TO THE ENVIRONMENTAL PROTECTION
AGENCY FOR A WASTEWATER DISCHARGE LICENCE**

under the Wastewater Discharge Authorisation Regulations S.I. 684 of 2007



Location : The agglomeration of Moogley , County Cork

Category of application : 500 to 1000 PE

Date Application Lodged : 22nd June 2009



Waste Water Discharge Licence Application Form

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EPA Ref. N^o: <i>(Office use only)</i>	<input type="text"/>
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Environmental Protection Agency
PO Box 3000, Johnstown Castle Estate, Co. Wexford
Lo Call: 1890 335599 Telephone: 053-9160600 Fax: 053-9160699
Web: www.epa.ie Email: info@epa.ie

Tracking Amendments to Draft Application Form

Version No.	Date	Amendment since previous version	Reason
V. 1.	11/10/07	N/A	
V. 2.	18/10/07	Inclusion of a Note 1 superscript for Orthophosphate in Tables D.1(i)(b) & D.1(ii)(b).	To highlight the requirement for filtered samples in measurement of O-Phosphate for waste water discharges.
V.3.	13/11/07	Amend wording of Section F.2 to include 'abstraction'. Amend wording of Checklist in Annex to reflect wording of Regulation 16(5) of S.I. No. 684 of 2007. Inclusion of unique point code for each point of discharge and storm water overflow.	To accurately reflect the information required To accurately reflect the Regulations and to obtain the application documentation in appropriate format. To aid in cross-referencing of application documentation.
V.4	18/04/08	Inclusion of requirement to provide name of agglomeration to which the application relates. Amend wording of Section B.7. (iii) to reflect the title of Water Services Authority. Addition of new Section B.9 (ii) in order to obtain information on developments yet to contribute to the waste water works. Addition of sub-sections C.1.1 & C.1.2 in order to clarify information required for Storm water overflow and pumping stations within the works. Amend Section D.1 to include a requirement for monitoring data for influent	To accurately determine the agglomeration to be licensed. To accurately reflect the Water Services Act, 2007. To obtain accurate population equivalent figures for the agglomeration. To obtain accurate information on design and spill frequency from these structures. To acquire information on the population loading onto the plant and to provide information on performance rates within

		to waste water treatment plants, where available. Amend wording of Section E.1 to request information on composite sampling/flow monitoring provisions.	the plant. To acquire accurate information on the sampling and monitoring provisions for discharges from the works.
V.5	07/07/2008	Amend wording of B.7 (iii) to include reference to Water Services Authorities. Amend Section G.1 to include Shellfish Waters Directive.	To accurately reflect the Water Services Act, 2007 requirements.
V.6	26/08/2008	Amendments to Section D to reflect new web based reporting. Amended requirements for reporting on discharges under E.1 Waste Water Discharge Frequency and Quantities. Amendment to Section F.1 to specify the type of monitoring and reporting required for the background environment. Removal of Annexes to application form.	To clarify the reporting requirements. To streamline reporting requirements. To clarify the reporting requirements for ambient monitoring. To reflect the new web based reporting requirements.

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Environmental Protection Agency
Application for a Waste Water Discharge Licence
Waste Water Discharge (Authorisation) Regulations 2007.

CONTENTS

	Page
ABOUT THIS APPLICATION FORM	4
PROCEDURES	6
SECTION A NON-TECHNICAL SUMMARY	8
SECTION B GENERAL	12
SECTION C INFRASTRUCTURE & OPERATION	19
SECTION D DISCHARGES TO THE AQUATIC ENVIRONMENT	27
SECTION E MONITORING	29
SECTION F EXISTING ENVIRONMENT & IMPACT OF THE DISCHARGE(S)	32
SECTION G PROGRAMME OF IMPROVEMENTS	44
SECTION H DECLARATION	47
ANNEX 1: TABLES/ATTACHMENTS	
ANNEX 2: CHECKLIST	

ABOUT THIS APPLICATION FORM

This form is for the purpose of making an application for a Waste Water Discharge Licence under the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007) or for the review of an existing Waste Water Discharge licence.

The Application Form **must** be completed in accordance with the instructions and guidance provided in the *Waste Water Discharge Licensing Application Guidance Note*. The Guidance Note gives an overview of Waste Water Licensing, outlines the licence application process (including the number of copies required) and specifies the information to be submitted as part of the application. The Guidance Note and application form are available to download from the Licensing page of the EPA's website at www.epa.ie.

A valid application for a Waste Water Discharge Licence must contain the information prescribed in the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007). Regulation 16 of the Regulations sets out the statutory requirements for information to accompany a licence application. The application form is designed in such a way as to set out these questions in a structured manner and not necessarily in the order presented in the Regulations. In order to ensure a legally valid application in respect of Regulation 16 requirements, please complete the Regulation 16 Checklist provided in Annex 2.

This Application Form does not purport to be and should not be considered a legal interpretation of the provisions and requirements of the Waste Water Discharge (Authorisation) Regulations, 2007. While every effort has been made to ensure the accuracy of the material contained in the Application Form, the EPA assumes no responsibility and gives no guarantee, or warranty concerning the accuracy, completeness or up-to-date nature of the information provided herein and does not accept any liability whatsoever arising from any errors or omissions.

Should there be any contradiction between the information requirements set out in the Application Form and any clarifying explanation contained in the accompanying Guidance Note, then the requirements in this Application Form shall take precedence.

PROCEDURES

The procedure for making and processing of applications for waste water discharge licences, and for the processing of reviews of such licences, appear in the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007) and is summarised below. The application fees that shall accompany an application are listed in the Third Schedule to the Regulations.

Prior to submitting an application the applicant must publish (within the two weeks prior to date of application) in a newspaper circulating in the area, and erect at the point nearest to the waste water treatment plant concerned or, if no such plant exists, at a location nearest the primary discharge point, a notice of intention to apply. An applicant, not being the local authority in whose functional area the relevant waste water discharge, or discharges, to which the relevant application relates, takes place or is to take place, must also notify the relevant Local Authority, in writing, of their intention to apply.

An application for a licence must be submitted on the appropriate form (available from the Agency) with the correct fee, and should contain relevant supporting documentation as attachments. The application should be based on responses to the form and include supporting written text and the appropriate use of tables and drawings. Where point source emissions occur, a system of unique reference numbers should be used to denote each discharge point. These should be simple, logical, and traceable throughout the application.

The application form is divided into a number of sections of related information. The purpose of these divisions is to facilitate both the applicant and the Agency in the provision of the information and its assessment. **Please adhere to the format as set out in the application form and clearly number each section and associated attachment, if applicable, accordingly.** Attachments should be clearly numbered, titled and paginated and must contain the required information as set out in the application form. Additional attachments may be included to supply any further information supporting the application. Any references made should be supported by a bibliography.

All questions should be answered. Where information is requested in the application form, which is not relevant to the particular application, the words "not applicable" should be clearly written on the form. The abbreviation "N/A" should not be used.

Additional information may need to be submitted beyond that which is explicitly requested on this form. Any references made should be supported by a bibliography. The Agency may request further information if it considers that its provision is material to the assessment of the application. Advice should be sought from the Agency where there is doubt about the type of information required or the level of detail.

Information supplied in this application, including supporting documentation will be put on public display and be open to inspection by any person.

Applicants should be aware that a contravention of the conditions of a waste water discharge licence is an offence under the Waste Water Discharge (Authorisation) Regulations, 2007.

The provision of information in an application for a waste water discharge licence which is false or misleading is an offence under Regulation 35 of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007).

Note: Drawings. The following guidelines are included to assist applicants:

- All drawings submitted should be titled and dated.
- All drawings should have a unique reference number and should be signed by a clearly identifiable person.
- All drawings should indicate a scale and the direction of north.
- All drawings should, generally, be to a scale of between 1:20 to 1:500, depending upon the degree of detail needed to be shown and the size of the facility. Drawings delineating the boundary can be to a smaller scale of between 1:1000 to 1:10560, but must clearly and accurately present the required level of detail. Drawings showing the waste water treatment plant location, if such a plant exists, can be to a scale of between 1:50 000 to 1:126 720. All drawings should, however, be A3 or less and of an appropriate scale such that they are clearly legible. Provide legends on all drawings and maps as appropriate.
- In exceptional circumstances, where A3 is considered inadequate, a larger size may be requested by the Agency.

It should be noted that it will not be possible to process or determine the application until the required documents have been provided in sufficient detail and to a satisfactory standard.

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SECTION A: NON-TECHNICAL SUMMARY

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

A non-technical summary of the application is to be included here. The summary should identify all environmental impacts of significance associated with the discharge of waste water associated with the waste water works. This description should also indicate the hours during which the waste water works is supervised or manned and days per week of this supervision.

The following information must be included in the non-technical summary:

A description of:

- the waste water works and the activities carried out therein,
- the sources of emissions from the waste water works,
- the nature and quantities of foreseeable emissions from the waste water works into the receiving aqueous environment as well as identification of significant effects of the emissions on the environment,
- the proposed technology and other techniques for preventing or, where this is not possible, reducing emissions from the waste water works,
- further measures planned to comply with the general principle of the basic obligations of the operator, i.e., that no significant pollution is caused;
- measures planned to monitor emissions into the environment.

Supporting information should form **Attachment N° A.1**

Non-Technical Summary

Mogeely is situated in East Cork approximately two kilometres north of Castlemartyr. It is located ten kilometres from Midleton and thirty three kilometres from Cork City. Mogeely is located on the former rail line between Youghal and Cork City and lies adjacent to the Kiltha River.

The Waste Water Works and the activities carried out therein

The existing collection system is estimated to serve seventy three houses and three public houses. Mogeely Waste Water Treatment Plant (WWTP) has a capacity of 1200PE and discharges treated effluent to the Kiltha River. The remainder of the properties in the village are served by individual septic tanks.

The WWTP which is operational since October 2008 is required to receive the waste water collected in the local sewerage system network and treat it to the required standards. All flows in excess of the designated capacity will be treated as storm-water. A volume equivalent to 3DWF for a two hour period will be stored and returned to the treatment stream when capacity is available in the WWTP. All additional flows will be conveyed from the storm water holding tank to the outfall pumps and discharged to the nearby Kiltha River via the primary discharge point.

Mogeely WWTP is modular in layout which has the capacity for expansion within the existing site boundary. The treatment capacity is phased as follows:

- Phase 1 – 1200PE
- Phase 2 – 2000PE

The contractor made provisions for the expansion of the WWTP to cater for the Phase 2 design capacity of 2000PE.

The scope of the works for Phase 1 included:

- Inlet Works
- Retention Tanks(s)
- Secondary Treatment Works
- Sludge Holding Tanks(s)
- Outlet Works and Outfall
- Miscellaneous Mechanical and Electrical Works
- Control Building
- Access Road
- The decommissioning, removal and disposal off site of the existing wastewater treatment plant in Mogeely village
- Site Roads and Footpaths
- Site Fencing
- Grass seeding and landscaping
- Approximately 700m of sewer

Mogeely WWTP is currently operated by a private operator under a temporary Operation and Maintenance Contract. The Service Provider is fully responsible for the provision of all plant, materials including consumables and labour and any licences and permits necessary to ensure that the facility is operated and maintained in accordance with the best practice and any performance requirements stipulated in the Employer's Requirements.

The design capacity for the WWTP for Phase 1 and Phase 2 are detailed in **Table A 1.1** and **Table A 1.2** below.

WWTP Design Capacity		
	Phase 1	Phase 2
Nominal Treatment Capacity	1200PE	2000PE
Dry Weather Flow (DWF)	216m ³ /day	360m ³ /day
Maximum design flow for treatment (3DWF)	7.5 l/s	12.5 l/s
Organic Load (60 g BOD/PE/Day)	72 kg BOD/day	120 kg BOD/day

Table A 1.1

WWTP Effluent Discharge Standards		
Parameter	Limit Phase 1	Limit Phase 2
Biochemical Oxygen Demand (mg/lBOD ₅)	15mg/l	10mg/l
Suspended Solids (SS)	15mg/l	10mg/l
Phosphorus (P, µg/l-P)	1mg/l	1mg/l
Ammonium (NH ₄)	12mg/l	8mg/l

Table A 1.2

The sources of emissions from the waste water works

The population load for the Mogeely agglomeration arises mainly from domestic population. The sewage from all commercial premises is collected via the public sewer and treated in conjunction with the domestic waste at the WWTP.

Other potential emissions from the waste water treatment plant include:

- Odour generated from the treatment process – there have been no recorded issues to date.
- Noise pollution – minor during normal operation. There have been no complaints regarding noise at the plant.

The nature and quantities of foreseeable emissions from the waste water works into the receiving aqueous environment as well as identification of significant effects of emissions on the environment.

The final effluent discharges to the Kiltha River which runs parallel to the site. The flows to the existing plant is in the order of 42m³/d to 87m³/d with an average inflow of 65m³/d entering the plant per day. The plant is designed for 1,200 PE. There is also a storm water holding tank with a capacity to hold a volume equivalent to 3DWF for a two hour period. Should hydraulic flows entering the plant exceed this capacity storm water will be discharged to the Kiltha River via the primary discharge point.

The proposed technology and other technologies for preventing or, where this is not possible, reducing emissions from the waste water works

Technology

The new WWTP includes the following elements:

- Inlet Screening including grit removal
- Storm Water Storage
- Primary settlement
- Secondary treatment
- Tertiary treatment

Techniques

The new WWTP shall be operated and maintained in accordance with the best practice and any performance requirements stipulated in the Employer's Requirements.

Further measures planned to comply with the general principle of the basic obligations of the operators, i.e., that no significant pollution is caused

Mogeely Waste Water Treatment Plant has the capacity within the existing site boundary to be increased to a 2000PE plant.

Measures planned to monitor emissions into the environment

The Cork County Council Environmental Laboratory carries out sampling of the influent and effluent. The Cork County Council Environmental Department located in Inniscarra takes samples from the stream upstream and downstream of the wastewater treatment plant outfall.

The private operators also carry out sampling of the influent and effluent to ensure that the plant is operating satisfactorily.

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SECTION B: GENERAL

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

B.1 Agglomeration Details

Name of Agglomeration: Mogeely

Applicant's Details

Name and Address for Correspondence

Only application documentation submitted by the applicant and by the nominated person will be deemed to have come from the applicant.

Provide a drawing detailing the agglomeration to which the licence application relates. It should have the boundary of the agglomeration to which the licence application relates clearly marked in red ink.

Name*:	Cork County Council
Address:	County Hall
	Carrigrohane Road
	Cork
Tel:	021 4276891
Fax:	021 4276321
e-mail:	

*This should be the name of the water services authority in whose ownership or control the waste water works is vested.

*Where an application is being submitted on behalf of more than one water services authority the details provided in Section B.1 shall be that of the lead water services authority.

Name*:	Patricia Power
Address:	Director of Services: Operational Area South
	Floor 5 (Tower)
	County Hall
	Cork
Tel:	021 4285285
Fax:	021 4276321
e-mail:	Patricia.power@corkcoco.ie

*This should be the name of person nominated by the water services authority for the purposes of the application.

Co-Applicant's Details

Name*:	Not applicable
Address:	Not applicable
Tel:	Not applicable
Fax:	Not applicable
e-mail:	Not applicable

*This should be the name of a water services authority, other than the lead authority, where multiple authorities are the subject of a waste water discharge (authorisation) licence application.

Design, Build & Operate Contractor Details

Name*:	EPS
Address:	Quartermown Industrial Estate
	Mallow
	Co. Cork
Tel:	022 31200
Fax:	022 31250
e-mail:	info@epsireland.com

*Where a design, build & operate contract is in place for the waste water works, or any part thereof, the details of the contractor should be provided.

Attachment B.1 should contain appropriately scaled drawings / maps ($\leq A3$) of the agglomeration served by the waste water works showing the boundary clearly marked in red ink. These drawings / maps should also be provided as geo-referenced digital drawing files (e.g., ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. These drawings should be provided to the Agency on a separate CD-Rom containing sections B.2, B.3, B.4, B.5, C.1, D.2, E.3 and F.2.

Attachment included	Yes	No
	✓	

B.2 Location of Associated Waste Water Treatment Plant(s)

Give the location of the waste water treatment plant associated with the waste water works, if such a plant or plants exists.

Name*:	Madeleine Healy
Address:	Killamucky
	Mogeely
	Co. Cork
Grid ref (6E, 6N)	196119E, 074683N
Level of Treatment	Tertiary
Primary Telephone:	021 4285233
Fax:	021 4276321
e-mail:	Madeleine.Healy@corkcoco.ie

*This should be the name of the person responsible for the supervision of the waste water treatment plant.

Attachment B.2 should contain appropriately scaled drawings / maps ($\leq A3$) of the site boundary and overall site plan, including labelled discharge, monitoring and sampling points. These drawings / maps should also be provided as geo-referenced digital drawing files (e.g., ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. These drawings should be provided to the Agency on a separate CD-Rom containing sections B.1, B.3, B.4, B.5, C.1, D.2, E.3 and F.2.

Attachment included	Yes	No
	✓	

B.3 Location of Primary Discharge Point

Give the location of the primary discharge point, as defined in the Waste Water Discharge (Authorisation) Regulation, associated with the waste water works.

Type of Discharge	Pipe to River
Unique Point Code	SW01MOGE
Location	Kiltha River
Grid ref (6E, 6N)	196000E, 074644N

Attachment B.3 should contain appropriately scaled drawings / maps ($\leq A3$) of the discharge point, including labelled monitoring and sampling points associated with the discharge point. These drawings / maps should also be provided as geo-referenced digital drawing files (e.g. ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. This data should be provided to the Agency on a separate CD-Rom containing the drawings and tabular data requested in sections B.1, B.2, B.4, B.5, C.1, D.2, E.3 and F.2.

Attachment included	Yes	No
	✓	

B.4 Location of Secondary Discharge Point(s)

Give the location of **all** secondary discharge point(s) associated with the waste water works. Please refer to Guidance Note for information on Secondary discharge points.

Type of Discharge	Not applicable
Unique Point Code	Not applicable
Location	Not applicable
Grid ref (6E, 6N)	Not applicable

Attachment B.4 should contain appropriately scaled drawings / maps ($\leq A3$) of the discharge point(s), including labelled monitoring and sampling points associated with the discharge point(s). These drawings / maps should also be provided as geo-referenced digital drawing files (e.g. ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. This data should be provided to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.5, C.1, D.2, E.3 and F.2.

Attachment included	Yes	No
		✓

B.5 Location of Storm Water Overflow Point(s)

Give the location of **all** storm water overflow point(s) associated with the waste water works.

Type of Discharge	Pipe to River
Unique Point Code	SW02MOGE
Location	Kiltha River
Grid ref (6E, 6N)	196000E, 074644N

Attachment B.5 should contain appropriately scaled drawings / maps ($\leq A3$) of storm water overflow point(s) associated with the waste water works, including labelled monitoring and sampling points associated with the discharge point(s). These drawings / maps should also be provided as geo-referenced digital drawing files (e.g. ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. This data should be provided to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, C.1, D.2, E.3 and F.2.

Attachment included	Yes	No
	✓	

B.6 Planning Authority

Give the name of the planning authority, or authorities, in whose functional area the discharge or discharges take place or are proposed to take place.

Name:	Cork County Council
Address:	Planning Department County Hall Carrigrohane Road Cork
Tel:	021 4276891
Fax:	021 4867007
e-mail:	Planninginfo@corkcoco.ie

Planning Permission relating to the waste water works which is the subject of this application: - (tick as appropriate)

<i>has been obtained</i>	✓	<i>is being processed</i>	
<i>is not yet applied for</i>		<i>is not required</i>	

Local Authority Planning File Reference N^o:	Not available
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Attachment B.6 should contain *the most recent* planning permission, including a copy of *all* conditions, and where an EIS was required, copies of any such EIS and any certification associated with the EIS, should also be enclosed. Where planning permission is not required for the development, provide reasons, relevant correspondence, etc.

Attachment included	Yes	No
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		✓
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B.7 Other Authorities

B.7 (i) Shannon Free Airport Development Company (SFADCo.) area

The applicant should tick the appropriate box below to identify whether the discharge or discharges are located within the Shannon Free Airport Development Company (SFADCo.) area.

Attachment B.7(i) should contain details of any or all discharges located within the SFADCo. area.

Within the SFADCo Area	Yes	No
		✓

B.7 (ii) Health Services Executive Region

The applicant should indicate the **Health Services Executive Region** where the discharge or discharges are or will be located.

Name:	Health Service Executive Southern Region
Address:	North Lee Local Health Office
	Floor 2, Abbeycourt House
	George's Quay
Tel:	021 4965511
Fax:	
e-mail:	info@hse.ie

B.7 (iii) Other Relevant Water Services Authorities

Regulation 13 of the Waste Water Discharge (Authorisation) Regulations, 2007 requires all applicants, not being the water services authority in whose functional area the relevant waste water discharge or discharges, to which the relevant application relates, takes place or is to take place, to notify the relevant water services authority of the said application.

Name:	Not applicable
Address:	Not applicable
Tel:	Not applicable
Fax:	Not applicable
e-mail:	Not applicable

Relevant Authority Notified	Yes	No
		✓

Attachment B.7(iii) should contain a copy of the notice issued to the relevant local authority.

Attachment included	Yes	No
		✓

B.8 Notices and Advertisements

Regulations 10 and 11 of the Waste Water Discharge (Authorisation) Regulations, 2007 require all applicants to advertise the application in a newspaper (within two weeks prior to date of application) and by way of a site notice. See *Guidance Note*.

Attachment B.8 should contain a copy of the site notice and an appropriately scaled drawing ($\leq A3$) showing its location. **The original application must include the original page of the newspaper in which the advertisement was placed.** The relevant page of the newspaper containing the advertisement should be included with the original and one (1) copy of the application.

Attachment included	Yes	No
	✓	

B.9 (i) Population Equivalent of Agglomeration

TABLE B.9.1 POPULATION EQUIVALENT OF AGGLOMERATION

The population equivalent (p.e.) of the agglomeration to be, or being, served by the waste water works should be provided and the period in which the population equivalent data was compiled should be indicated.

Population Equivalent	616
Data Compiled (Year)	2008
Method	Geodirectory Assessment

B.9 (ii) Pending Development

Where planning permission has been granted for development(s), but development has not been commenced or completed to date, within the boundary of the agglomeration and this development is being, or is to be, served by the waste water works provide the following information;

- information on the calculated population equivalent (p.e.) to be contributed to the waste water works as a result of those planning permissions granted,
- the percentage of the projected p.e. to be contributed by the non-domestic activities, and
- the ability of the waste water works to accommodate this extra hydraulic and organic loading without posing an environmental risk to the receiving water habitat.

A PE of 560 was obtained by a geodirectory assessment. An additional 10% has been added to this figure in order to account for future development. This allows for a potential increase in the PE of up to 616 during the course of the licence.

B.9 (iii) FEES

State the relevant Class of waste water discharge as per Column 1 of the Second Schedule, and the appropriate fee as per Columns 2 or 3 of the Third Schedule of

the Waste Water Discharges (Authorisation) Regulations 2007, S.I. No. 684 of 2007.

Class of waste water discharge	Fee (in €)
	10,000

Appropriate Fee Included	Yes	No
	✓	

B.10 Capital Investment Programme

State whether a programme of works has been prioritised for the development of infrastructure to appropriately collect, convey, treat and discharge waste water from the relevant agglomeration. If a programme of works has been prioritised provide details on funding, (local or national), allocated to the capital project. Provide details on the extent and type of work to be undertaken and the likely timeframes for this work to be completed.

Attachment B.10 should contain the most recent development programme, 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
		✓

B.11 Significant Correspondence

Provide a summary of any correspondence resulting from a Section 63 notice issued by the Agency in relation to the waste water works under the Environmental Protection Agency Acts, 1992 and 2003, as amended by Section 13 of Protection of the Environment Act, 2003.

Attachment B.11 should contain a summary of any relevant correspondence issued in relation to a Section 63 notice.

Attachment included	Yes	No
		✓

B.12 Foreshore Act Licences.

Provide a copy of the most recent Foreshore Act licence issued in relation to discharges from the waste water works issued under the Foreshore Act 1933.

Attachment B.12 should contain the most recent licence issued under the Foreshore Act 1933, including a copy of *all* conditions attached to the licence and any monitoring returns for the previous 12-month period, if applicable.

Attachment included	Yes	No
		✓

SECTION C: INFRASTRUCTURE & OPERATION

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

C.1 Operational Information Requirements

Provide a description of the plant, process and design capacity for the areas of the waste water works where discharges occur, to include a copy of such plans, drawings or maps, (site plans and location maps, process flow diagrams), and such other particulars, reports and supporting documentation as are necessary to describe all aspects of the area of the waste water works discharging to the aquatic environment. Maps and drawings must be no larger than A3 size.

C.1.1 Storm Water Overflows

For each storm water overflow within the waste water works the following information shall be submitted:

- An assessment to determine compliance with the criteria for storm water overflows, as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows*', 1995 and any other guidance as may be specified by the Agency, and
- Identify whether any of the storm water overflows are to be decommissioned, and identify a date by which these overflows will cease, if applicable.

C.1.2 Pumping Stations

For each pump station operating within the waste water works, provide details of the following:

- Number of duty and standby pumps at each pump station;
- The measures taken in the event of power failure;
- Details of storage capacity at each pump station;
- Frequency and duration of activation of emergency overflow to receiving waters. Clarify the location where such discharges enter the receiving waters.

Mogeely Waste Water Treatment plant

Mogeely is situated in East Cork approximately two kilometres north of Castlemartyr. It is ten kilometres from Midleton and thirty three kilometres from Cork City. Mogeely is located on the former rail line between Youghal and Cork City and lies adjacent to the Kiltha River.

The existing collection system is estimated to serve seventy three houses and three public houses. Mogeely Waste Water Treatment Plant has a capacity of 1200PE and discharges treated effluent to the Kiltha River. The remainder of the properties in the village are served by individual septic tanks.

The scope of the new works included:

- Inlet Works
- Retention Tanks(s)
- Secondary Treatment Works

- Sludge Holding Tanks(s)
- Outlet Works and Outfall
- Miscellaneous Mechanical and Electrical Works
- Control Building
- Access Road
- The decommissioning, removal and disposal off site of the existing wastewater treatment plant in Mogeely village
- Site Roads and Footpaths
- Site Fencing
- Grass seeding and landscaping
- Approximately 700m of sewer

Inlet Works

The raw sewage flows through the inlet automatic screen by gravity. The screen starts automatically on a high level as detected by ultrasonic level sensor. Start up of screen will open solenoid valve, and initiate the duty wash pump to wash the screenings. Level sensor provides dry run protection for the wash pumps.

When the cut out level is reached in the inlet channel as detected by ultrasonic level sensor, the screen and wash water pump will run on for a set period and then stop and solenoid valve will close.

Should any failure occur on the automatic screen, the manual bypass rake-bar screen may be made operational.

An automatic sampler is positioned on the inlet sump to take composite samples of the effluent prior to being treated.

Protection & Control

- The Inlet Screen & Wash Pump will be fitted with overload and over-temperature protection
- If the Inlet Screen trips an alarm will be generated
- Low level or loss of echo on the ultrasonic level sensor will generate an alarm thus providing dry run protection
- The Screen will have an Emergency-stop pushbutton loaded adjacent to it. Operation of the E-Stop will stop the motor and generate an alarm. Reset will be via a pushbutton on the MCC
- The Inlet Screen will have Hand / Off / Auto control. In hand & Auto, the following protection will be provided for the pump: Overload, over-temperature and low-low level cut out. Low-low control is via hardwired relay on the ultrasonic level sensor.

Inlet Sump

The screened effluent flows into the inlet sump by gravity from the inlet screen. Two submersible variable speed pumps which are controlled by a flowmeter, arranged in

duty / standby configuration, pump the sewage to the aeration tank. Low level protection is provided by an ultrasonic level sensor.

Each pump is provided with a hand off auto key on its respective starter. In automatic operation, the duty pump is selected by the Programme Logic Controller (PLC) and in the event that the duty pump fails, an alarm is generated and the standby pump shall be started automatically provided both pumps are selected to auto and available for operation. If both of these pumps fail an alarm will be generated.

In hand operation, duty selection is provided by means of a duty selector switch on the HMI, which only allows one pump to operate at any given time.

The normal start stop control of the duty pump is provided by means of pre-determined cut-in cut-out set points, setup at commissioning.

Protection & Control

- The motors will be fitted with overload and over-temperature protection
- If the inlet duty pump trips, the standby pump will start automatically. If both pumps trip, an alarm will be generated
- Low level or loss of echo on the ultrasonic level sensor will generate an alarm
- Duty selection will be provided for HMI at the MCC
- Each motor / pump will have an Emergency- stop pushbutton located adjacent to it. Operation of the E-Stop will stop the motor and generate an alarm. Reset will be via MCC pushbutton.
- The pumps / motors will have Hand / Off / Auto control. In hand, the following protection will be provided for the pumps; Overload, over-temperature and low-low level cut out. Low-low control is via hardwired relay on the ultrasonic level sensor.
- High-high alarm on the ultrasonic level sensor will alternate to standby pump

Storm Pumps

The Inlet sump is fitted with two submersible fixed speed Storm Pumps, arranged in duty / standby configuration. In the event of storm conditions and the level sensor detects a high- level in the Inlet Sump the duty Storm Pump starts and pumps the sewage to the Storm tank. Low-level protection is provided by the ultrasonic level sensor.

Each pump is provided with a hand off auto key on its respective starter. In automatic operation, the duty pump is selected by the PLC and in the event that the duty pump fails, an alarm is generated and the standby pump shall be started automatically provided both pumps are selected to auto and available for operation. If both of these pumps fail an alarm will be generated.

In hand operation, duty selection is provided by means of a duty selector switch on the HMI, which only allows one pump to operate at any one time.

A flowmeter located on the Storm Water Holding Tank inlet monitors the amount of Storm Water delivered to the Storm Water Holding Tank.

A second flowmeter located on the Storm Water Holding Tank emergency overflow monitors the amount of Storm Water delivered to the Outfall Tank.

Protection & Control

- The motors will be fitted with overload and over-temperature protection
- If the duty pump trips, the standby pump will start automatically. If both pumps trip an alarm will be generated
- Low level or loss of echo on the ultrasonic level sensor will generate an alarm
- Duty selection will be provided for HMI at the MCC
- Each motor / pump will have an Emergency-stop pushbutton located adjacent to it. Operation of the E-Stop will stop the motor and generate an alarm. Reset will be via MCC pushbutton
- The pumps / motors will have Hand / Off / Auto control. In hand, the following protection will be provided for the pumps: Overload, over-temperature and low-low level cut out. Low-low control is via hardwired relay on the ultrasonic level sensor.

Storm Water Holding Tank

The Storm Water Storage Tank provides extra capacity in times of heavy rainfall. A Venturi (Cleaning) pump is controlled by ultrasonic level sensor and cleans the base of the storm tank. When the level in the storm tank reaches a preset level, the ultrasonic sensor sends a signal to the PLC, which starts the Venturi Pump. The Venturi pump sucks in water and atmospheric air, which is discharged into the bottom of the Storm Tank helping to suspend the sewage and clean the base of the tank. When the level in the tank reaches a preset low level the Venturi Pump automatically cuts out.

Protection & Control

- The Venturi Pump will be fitted with overload and over-temperature protection.
- If the Venturi Pump trips an alarm will be generated.
- Low level or loss of echo on the ultrasonic level sensor will generate an alarm thus providing dry run protection
- The Venturi Pump will have Emergency-stop pushbutton located adjacent to it. Operation of the E-stop will stop the motor and generate an alarm. Reset will be via a pushbutton on the MCC
- The Venturi Pump will have Hand / Off / Auto control. In hand & Auto, the following protection will be provided for the pump: Overload, over-temperature and low-low level cut out. Low-low control is via hardwired relay on the ultrasonic level sensor.

Ferric Dosing

Ferric is dosed to the raw sewage at the inlet to the aeration tank by the 2 No. duty / standby Ferric dosing pumps. The pumps are fixed speed manual stroke control determined by the operation of the Inlet Pumps.

A Level Probe will monitor the level of chemical available in the bulk storage tank thus providing dry run protection.

During automatic operation, in the event that the duty pump fails, the standby pump shall be started automatically, provided both pumps are selected to auto and available for operation.

If both these dosing pumps fail an alarm will be generated.

Aeration Tank

There are two variable speed Air Blowers arranged in a duty / standby configuration provided. Dissolved oxygen probes constantly monitor the oxygen levels in the Aeration Tank. The speed of the air blowers will be controlled directly by the DO probe in the Aeration Tank. A local / remote switch is fitted to each drive. The remote switch will provide the air blower with a signal which will increase or decrease the speed of the blowers depending on the levels of DO required. With the local switch a potentiometer will be mounted on each blower starter section in the MCC panel to control the blowers operating on manual. Each blower will run at a set minimum speed to ensure proper ventilation of the unit. Each air blower enclosure is fitted with an acoustic hood and acoustic cooling fan respectively.

Protection & Control

- The blowers will be fitted with overload and over-temperature protection
- If the duty Air Blower trips, the standby Blower will start automatically. If both blowers trip an alarm will be generated
- Duty selection will be provided for via the HMI at the MCC
- Each blower will have an Emergency-stop pushbutton located adjacent to it. Operation of E-Stop will stop the motor and generate an alarm. Reset will be via MCC pushbutton.
- The Air Blowers will have Hand / Off / Auto control. In hand, the following protection will be provided for the pumps: Overload, over-temperature.

Clarifier & RAS / WAS Pumps

The clarifier has a rotating half-bridge, which turns about an axis. Two VSD driven RAS / WAS arranged in duty / standby configuration pump sludge received from the clarifier back to the aeration tank (RAS) and Picket Fence Thickener (WAS). The duty pump returns sludge continuously to the aeration tank. A flowmeter located on the RAS line monitors the amount of RAS delivered to the Aeration tank.

A flowmeter located on the WAS line monitors the amount of WAS delivered to the Picket Fence Thickener. The RAS / WAS flows will be operator adjustable via the HMI when in automatic operation. Two timers will be provided on HMI to allow the operator to adjust the frequency of the WAS cycles interval and the length of each WAS cycle.

Scum is collected from the top of the clarifiers and is drawn off by a scum box, which returns it by gravity to the inlet sump. The clarified effluent overflows the v-notch weir at the top of the settlement tank and gravitates to the outfall chamber.

Protection & Control

- The RAS / WAS and clarifier motors will be fitted with overload and over-temperature protection
- If the duty RAS / WAS pump trips the standby pump will start automatically. If both pumps trip an alarm will be generated
- Duty selection will be provided for via the HMI at the MCC
- Each motor / pump will have an Emergency-stop pushbutton located adjacent to it. Operation of the E-stop will stop the motor and generate an alarm. Reset will be via MCC pushbutton
- The pumps / motor will have Hand / Off / Auto control. In hand, the following protection will be provided for the pumps: Overload, over-temperature.

Tertiary Sand Filter Unit

The plant incorporates tertiary treatment in the form of a sand filter which filters the effluent emanating from the clarifier.

Incoming water is pumped by variable speed controlled forward feed pumps into the inlet shaft and is distributed evenly across the filter bed by v-notch openings along the length of the filter. The inlet shaft is taller than the main filter tank and provides 650mm of available head across the filter bed.

Solids are filtered from the water and the clean water overflows above the filter bed. The sand filters continuously clean themselves while in service. This is done by transferring dirty sand from the base of the filter by an air supply into an open pipe with a series of cones which separate the dirt particles from the sand.

Washing Process

When the forward feed pumps start the solenoid valve opens to allow air into the filter. Air is supplied to each side of the filter by a duty compressor. When the forward feed pump stops the valve will close.

Outfall Sump

The treated effluent flows by gravity from the Tertiary Sand Filter Unit into the Outlet Sump, which is fitted with three submersible fixed speed pumps operating in duty / assist / standby configuration. The sump is fitted with an ultrasonic level sensor which controls the operation of the pumps. The duty pump will start when the sewage reaches a predetermined high level in the sump and cut out at a predetermined low level. Should the level in the sump reach a second predetermined high level in the high level the assist pump shall cut in and both pumps will pump until the cut out low level is reached.

Each pump is provided with a hand off auto key on its respective starter. In automatic operation, the duty pump is selected by the PLC and in the event that the duty pump fails, an alarm is generated and the standby pump shall be started automatically provided both pumps are selected to auto and available for operation. If all of these pumps fail an alarm will be generated.

An automatic sampler is also positioned on the inlet to the outlet sump to take composite samples of the effluent prior to being discharged.

A flowmeter located on the outlet line monitors the amount of treated water pumped to the Kiltha River.

Protection & Control

- The motors will be fitted with overload and over-temperature protection
- If the duty pumps trip the standby pump will start automatically. If two pumps trip an alarm will be generated
- Duty selection will be provided for via the HMI at the MCC
- Low level or loss of echo on the ultrasonic level sensor will generate an alarm thus providing dry run protection
- The pumps will have an Emergency-stop the motor and generate an alarm. Reset will be via a pushbutton on the MCC
- The pumps / motors will have Hand / Off / Auto control. In Hand & Auto the following protection will be provided for the pump: Overload, over-temperature and low level cut-out.

Picket Fence Thickener

From the RAS / WAS pump sump, sludge from the clarifier is pumped to the picket fence thickener. Flow enters the PFT through the top of the diffuser in the tank. The sludge then settles and is thickened in the tank. Water needs to be occasionally drawn off from the top, this is achieved by supernatant draw-off, and liquid overflows a v-notch weir to the supernatant and returns to the inlet sump by gravity. The hopper of the PFT has an outlet at its base linked to a Bauer connection outside the tank; this allows the sludge to be drawn off-site by tanker.

Protection & Control

- The PFT motor and gearbox are fitted with overload, over-temperature protection
- Emergency-stop pushbutton for the PFT will be located adjacent to the tank. Operation of the E-stop will stop the PFT and it shall not be capable of restart until button is reset. A local isolator will also be fitted on the bridge itself. Emergency button reset will be via MCC pushbutton.

C 1.1. Storm Water Overflows

There is a storm water overflow which conveys excess waste water from the storm water holding tank to the outlet tank. Storm water is discharged to the Kiltha River from the outlet tank via the primary discharge point.

C 1.2. Pumping Stations

There is no pumping station in the Mogeely sewerage network, all sewage flows by gravity to the septic tank.

Primary Discharge Point

There is one primary discharge point from the treatment plant. The outlet from the plant conveys treated effluent to the Kiltha River via a 200mm pipe to the outfall point. A non-return valve is fitted at the end of the discharge pipe.

Attachment C.1 should contain supporting documentation with regard to the plant and process capacity, systems, storm water overflows, emergency overflows, etc., including flow diagrams of each with any relevant additional information. These drawings / maps should also be provided as geo-referenced digital drawing files (e.g. ESRI Shapefile, MapInfo Tab, AutoCAD or other upon agreement) in Irish National Grid Projection. This data should be provided to the Agency on a separate CD-Rom containing sections B.1, B.2, B.3, B.4, B.5, D.2, E.3 and F.2.

Attachment included	Yes	No
	✓	

C.2 Outfall Design and Construction

Provide details on the primary discharge point & secondary discharge points and storm overflows to include reference, location, design criteria and construction detail.

There is no information regarding the invert of the discharge pipe, nor any technical construction details regarding the outfall.

Attachment C.2 should contain any supporting documentation on the design and construction of any and all discharge outfalls, including stormwater overflows, from the waste water works.

Attachment included	Yes	No
		✓



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SECTION D: DISCHARGES TO THE AQUATIC ENVIRONMENT

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

Give particulars of the source, location, nature, composition, quantity, level and rate of discharges arising from the agglomeration and, where relevant, the period or periods during which such emissions are made or are to be made.

Details of all discharges of waste water from the agglomeration should be submitted via the following web based link: http://78.137.160.73/epa_wwd_licensing/. The applicant should address in particular all discharge points where the substances outlined in Tables D.1(i), (b) & (c) and D.1(ii), (b) & (c) of Annex 1 are emitted.

Where it is considered that any of the substances listed in Annex X of the Water Framework Directive (2000/60/EC) or any of the Relevant Pollutants listed in Annex VIII of the Water Framework Directive (2000/60/EC) are being discharged from the waste water works or are seen to be present in the receiving water environment downstream of a discharge from the works (as a result of any monitoring programme, e.g., under the Water Framework Directive Programme of Measures) the applicant shall screen the discharge for the relevant substance.

D.1 Discharges to Surface Waters

Details of all discharges of waste water from the agglomeration should be supplied via the following web based link: http://78.137.160.73/epa_wwd_licensing/. Tables D.1(i)(a), (b) & (c), should be completed for the primary discharge point from the agglomeration and Tables D.1(ii)(a), (b) & (c) should be completed for **each** secondary discharge point, where relevant. Table D.1(iii)(a) should be completed for **each** storm water overflow. Individual Tables must be completed for each discharge point.

Where monitoring information is available for the influent to the plant this data should also be provided in response to Section D.1.

Supporting information should form **Attachment D.1**

Attachment included – Provided in E4	Yes	No
		✓

D.2 Tabular Data on Discharge Points

Applicants should submit the following information for each discharge point:

Table D.2:

PT_CD	PT_TYPE	LA_NAME	RWB_TYPE	RWB_NAME	DESIGNATION	EASTING	NORTHING
SW01M OGE	Primary	Cork County Council	River	Kiltha River	None	196000E	074644N
SW02M OGE	Secondary	Cork County Council	River	Kiltha River	None	196000E	074644N

An individual record (i.e. row) is required for each discharge 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. 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, E.3 and F.2.

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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.

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.

E.2 Monitoring in respect of Mogeely Waste Water Licence Application

The plant is currently monitored by the Environmental Directorate of Cork County Council to measure compliance with the requirements of the Urban Wastewater Directive. Samples are also collected upstream and downstream of the discharge location at this time. The Kiltha River, which is the receiving water body, is monitored in terms of the Freshwater Fish Directive, the Phosphorus Regulations by the Water laboratory of Cork County Council and in recent times the Water Framework Directive as part of the River Basin Project. It is proposed to continue this multi-faceted approach to monitoring the treatment plant and the impacts of the discharge to the receiving waters.

General Laboratory Information

The Wastewater Laboratory of Cork County Council is accredited for a number of analytical tests under the Irish National Accreditation Board (INAB) under the ISO 17025 international standard. The details of the Accreditation can be found in Attachment E.2. The Wastewater Laboratory of Cork County Council is currently accredited for the following parameters under the ISO 17025 system:

- pH
- Biochemical Oxygen Demand
- Chemical Oxygen Demand
- Suspended Solids
- Ammonia
- Ortho Phosphates
- Total Phosphates
- Chloride
- Sulphate

The laboratory perform a number of analytical tests e.g. fats, oil , grease and metals using an ICP-OES system and while the Wastewater Laboratory of Cork County Council is not currently accredited for extra tests the same analytical procedures and protocol are adhered to by the laboratory as would be required if the tests were accredited. The laboratory also participates in proficiency testing schemes which measure the accuracy of the results and performance of the laboratory in both the EPA scheme and the WRC Aquacheck scheme from the UK. The performance of the laboratory in these schemes is excellent and the non-accredited tests are within the performance criteria for the schemes as evaluated by the scheme coordinators.

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

Attachment included	Yes	No
	✓	

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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
SW01	Primary Discharge	S	E 196119	N 074669	N
aSW01u	Primary Discharge	S	E 195950	N 075159	N
aSW01d	Primary Discharge	S	E 196371	N 073247	N

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. 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.1, D.2 and F.2.

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
	✓	

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://38.437.160.73/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/EEC¹ 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/EEC²;

¹Council 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)

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

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

Existing Environment

The receiving water body of the Mogeely Waste Water Treatment Plant is the Kiltha River, of the Womanagh Catchment. All effluent from the treatment plant is discharged via a primary discharge point to the Kiltha River.

The Kiltha River drains the north-west area of the Womanagh Catchment (approximately 30km²) including the settlements of Mogeely and Castlemartyr. It flows through a narrow valley for approximately 17km before meeting the Womanagh main channel immediately upstream of Ladysbridge.

Downstream of the Kiltha –Womanagh confluence, the River Dower and the River Dissour enter the Womanagh River, prior to discharge into Youghal Bay. The Womanagh River becomes tidal at Finisk Bridge, immediately downstream of the Womanagh-Dissour confluence and 8km upstream of the bay. The lower stretches of the Womanagh River are meandering and characterised by a soft substrate due to silt deposition. The river becomes estuarine near the shoreline.

The majority of the Womanagh Catchment lies within the Little Island formation which extends from Crookstown in the west to Youghal at the east of the syncline. The limestone of the Cork syncline to the north of Ballymacoda is considered a major aquifer and permeability is generally high. Karst features are typical of such formations and are reflected in large springs such as the Dower water supply near Castlemartyr. The upper section of the Kiltha catchment is located within the Ballytrasna formation which consists of mudstone with some sandstone. Thus the karst features which are prominent in the lower catchment are absent from the upper section of the river.

There was a consistent trend recorded by the EPA with respect to the four monitoring stations on the Kiltha River (0300, 0500, 0700, 1000). Q-values recorded in station 0700 over 1999 and 2008 did not change. The three upstream stations on the Kiltha River were satisfactory in 2005, and only Castlemartyr exhibited reduced water quality. The EPA noted in 2002 that deleterious discharges at two locations influenced water quality. The results from these stations upstream and downstream of Mogeely WWTP discharge point are outlined in **Table F.1.1**.

Station	Location	1989	1994	1997	1999	2002	2005	2008
0700	Second Br N of Mogeely	4	4	4-5	4	4	4	4
1000	Br in Castlemartyr	3-4	4	3-4	3	3-4	3-4	3-4

Table F.1.1.

Biological monitoring was carried out by Dixon Brosnan in March 2006 as part of the Womanagh Catchment Assessment which is included in **Attachment F1**. Monitoring was carried out on at a number of locations on the Kiltha River and Q-values were

assigned on the basis of macroinvertebrate density and diversity found. The stations upstream and downstream of the Mogeely WWTP discharge point are shown in **Table F1.2**.

Station	Location	Q-Value
B1	150m upstream of Mogeely Village	4-5
B1A	50m downstream of Mogeely WWTP discharge	4-5
B2	50m downstream of Mogeely Village and all discharges (Including Dairygold)	4-5

Table F.1.2

At Mogeely Q-values of 4-5 were assigned to all three sites. Pollution sensitive genera found included the stoneflies *Isoperla sp.*, *Chlorperla sp.* and *Protonemura sp.*, and the mayflies *Rhrithrogena sp.* and *Ecdynorus sp.* Trout were noted within the watercourse at sites B1 and B2, stone loach at B1A, and the rare brook lamprey at B1 and B3.

The Dairygold facility at Mogeely discharges during the period from March to October, and thus there may be seasonal impacts on water quality. To determine if there is a greater impact on the watercourse when the plant is discharging and water levels are low, additional biological monitoring was carried out at three locations in September 2006. Results are detailed in Table 9.4 of the Womanagh Catchment Assessment which is included in **Attachment F1**.

Water Quality Standards

The Water Framework Directive (WFD) aims to establish an integrated approach to water protection, improvement and sustainable use. In order to achieve the requirements of the WFD, Ireland has been divided into a number of River Basin Districts. The South Western River Basin District (SWRBD) comprises substantially the counties of Cork and Kerry, all of Cork City, and also parts of counties Limerick, South Tipperary and Waterford.

Hydrometric Area 19 (Lee – Cork Harbour – Youghal Bay) is included in the SWRBD. The overall objectives of the SWRBD project include the following:

- Strengthen compliance with EU Directives and national legislation
- Collect and analyse information to determine water quality and identify possible threats to water status
- Prevent further deterioration and protect / enhance water quality
- Develop a programme of measures to address all significant pressures and sources of impact on aquatic ecosystems and groundwater
- Encourage and facilitate public participation including the maintenance of a project website
- Promote sustainable water use

In order to achieve these objectives the following project tasks have been identified:

- Identify pressures on water bodies and assess risk of not achieving compliance with the Water Framework Directive
- Prepare a Characterisation Report
- Identify Heavily Modified (HMWB) and Artificial Water Bodies (AWB)
- Establish data management system and GIS
- Prepare programme of measures
- Review of monitoring needs
- Design monitoring programme
- Prepare River Basin Management Strategy
- Assist public participation in the project
- Prepare printed reports
- Assist capacity building

The SWRBD have yet to set water quality standards for either the Kiltha River or the Womanagh River under a water quality or catchments management plan. The River Basin Management System currently being developed will include a programme of measures and a River Basin Management Strategy, designed to achieve at least good status for all waters by 2015, and to maintain high status where it exists. A copy of the Water Quality Management Plan for this area has been included in **Attachment F**.

Areas of Conservation

The Department of the Environment, Heritage and Local Government is responsible for the designation of conservation sites in Ireland. It is required under European law and national laws to conserve habitats and species, through designation of conservation areas under Special Areas of Conservation, Natural Heritage Areas and Special Protection Areas.

Special Areas of Conservation

Candidate Special Areas of Conservation (cSAC) are protected under the European Union (EU) Habitats Directive (92/43/EEC), as implemented in Ireland by the European Communities (Natural Habitats) Regulations, 1997.

There Special Areas of Conservation designated for the Kiltha River. The lower stretches of the Womanagh River, from Clonpriest to the location where the river enters Youghal Bay is a designated Special Area of Conservation. This site's conservation value derives largely from the presence of a number of important coastal habitats listed in Annex I of the European Union Habitats Directive. The Ballymacoda (Clonpriest & Pillmore) Site Synopsis is included in **Attachment F.1**.

Natural Heritage Areas

There are no Natural Heritage Areas designated for the Kiltha River. The lower stretches of the Womanagh River, from Clonpriest to the location where the Womanagh River enters Youghal Bay is a proposed National Heritage Area. Under the Wildlife Amendment Act 2000, NHAs are legally protected from damage from the date they are formally proposed for designation. National Heritage Areas are the

basic designation for wildlife. An NHA is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.

Special Protection Areas

Special Protection Areas (SPAs) are designated in order to safeguard certain habitats pursuant to EU Directive requirements. The EU Birds Directive (79/409/EEC) requires designation of SPAs for listed rare and vulnerable species, migratory species and wetlands. There are no Special Protection Areas designated for the Kiltia River. The lower stretches of the Womanagh River, from Clonpriest to the location where the Womanagh River enters Youghal Bay is a Special Protection Area.

Existing Receiving water

The 2008 EPA Water Quality Report indicated that the water quality in the Kiltia River has a moderate water quality over the period of the last report. The biological water quality data for Station 1000 at the bridge in Castlemartyr had a consistent Q3-4 value (moderate water quality) from 2002 up to the most recent values in 2008.

Surface Water Directive

There are no surface water abstractions downstream of the discharge point.

Groundwater Directives

The Groundwater Directives (80/778/EEC) does not apply, as there are no discharges to ground in the current operation.

Bathing Water Directive

The Bathing Water Regulations 1992 (SI No. 155 of 1992), lay down quality requirements for inland and coastal waters as designated bathing areas. There are no designated inland bathing areas in the Womanagh catchment nor are there any designated beaches on the Womanagh estuary. Consequently Directive 76/160/EEC does not directly apply.

Freshwater Fish Directive & Salmonid Regulations

Neither the Womanagh River nor its tributaries have been designated under the Regulations and it is not expected that they will be designated in the immediate future. The Womanagh is an important fisheries for sea trout (*Salmo trutta*) and brown trout (*s. trutta*). The Womanagh does not have a large run of salmon (*S. salar*). Sea bass (*Dicentrarchus labrax*) have been caught in the Womanagh Estuary. Large shoals of grey mullet (*Chelon labrosus*) move upstream at high tide, while flatfish such as flounder (*Platichthys flesus*) also occur in the estuary. It has been suggested that smelt (*Osmerus eperlanus*) and/or shad (*Alsoa sp.*) may be present in the catchment although no data is available.

EU Shellfish Waters Directive

EU Shellfish Waters Directive (79/923/EEC) on the quality required by shellfish waters, EU Directive on Health Conditions and the placing of Live Molluscs (91/67/EEC) and the associated Quality of Shellfish Waters Regulations 1994 (SI No. 200 of 1994) specify designated coastal and brackish waters needing protection or improvement in order to support shellfish. Specified limit values apply to these areas.

It must be noted that there is a Shellfish Designation in Youghal/Ballymacoda Bay where the Womanagh River discharges to the sea. The effluent from the plant should not affect the Shellfish Waters, due to a distance of approximately 20km from the discharge point to the designated area.

Urban Waste Water Treatment Directive

The Environmental Protection Agency Act 1992 (Urban Waste Water Treatment) Regulations 1994 (SI No. 419 of 1994) were issued to give effect to EU Directive (91/271/EEC) concerning urban waste water treatment. The regulations specify that waste water arising from populations of less than 2000 shall, by the end of 2005, be subject to appropriate treatment prior to discharge. Appropriate treatment is defined as:

...any process and/or disposal system which after discharge allows the receiving waters to meet the relevant provisions of the Directive and of other community Directives.

Relevant Community Directives are Directives 75/440/EEC, 78/160/EEC, 78/659/EEC and 79/923/EEC, all of which have been discussed above. Where the agglomeration served is over 2000PE (10000PE if coastal) the second schedule shall not exceed 25 mg/l and 35 mg/l respectively. The limits specified in the Urban Waste Water Treatment Directive are not considered onerous, and compliance with stricter articles of legislation such as the Fisheries Directive will ensure compliance with the Urban Waste Water Treatment Directive.

Phosphorus Regulations

The Local Government (Water Pollution) Act 1977 (Water Quality Standards for Phosphorus) Regulations 1998 (SI No. 258 of 1998) were introduced to counter eutrophication observed throughout Irish watercourses and also to comply with Council Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment.

The regulations oblige authorities to maintain or improve the quality at any part of a river by 2007 with reference to the Biological Quality Rating (Q value). The target values are shown in table F1.1.

A Biological Quality Rating of Q4 represents satisfactory water quality. Eutrophication is unlikely to occur in water bodies with a biological quality rating of Q4 or higher. **Table F1.3** shows the Q-values for the monitoring points upstream and downstream of the Mogeely WWTP discharge point.

Station	Location	2002	2005	2008
0700	Second Br N of Mogeely	4	4	4
1000	Br in Castlemartyr	3-4	3-4	3-4

Table F.1.3

F.1 (I) Waste Assimilative Capacity of Receiving Waters**Assimilative Capacity**

Receiving waters should have a capacity to assimilate effluent discharges without showing signs of pollution. It is desirable that any effluent discharge to the Kiltha River should not

- increase the BOD₅ level in the water by more than 1mg/l;
- increase the overall BOD₅ in the water to more than 4mg/l (ideally 3mg/l);
- increase the Ortho Phosphate level in the water to more than 0.03mg/l;

Assimilative Capacity of the Receiving Water**Mass Balance Equation for Orthophosphates:**

Gauge number 19003, at Castlemartyr

Median flow of River (station 19003) = 0.465881m³/sec

Median oPO₄-P in River (upstream) = 0.05mg/l

Average volume of discharge = 0.003 m³/sec

Median value for oPO₄-P in discharge = 1.84mg/l

$$C_{\text{final}} = (0.465881 \times 0.05) + (0.003 \times 1.84)$$

$$\frac{\quad}{(0.465881 + 0.003)}$$

$$C_{\text{final}} = 0.061 \text{ mg/l oPO}_4\text{-P}$$

The increase in Orthophosphate due to the discharge of Mogeely WWTP is .011 mg/l.

Mass Balance Equation for BOD:

Gauge number 19003, at Castlemartyr

Flow of River (95% ile) = 0.033m³/sec

Median BOD in River (upstream) = 2.0mg/l

Average volume of discharge = 0.003 m³/sec

Median value for BOD in discharge = 8.5mg/l

$$C_{\text{final}} = \frac{(0.033 \times 2.0) + (0.003 \times 8.5)}{(0.033 + 0.003)}$$

C_{final} = 2.54mg/l BOD

The increase in BOD due to the discharge of Mogeely WWTP is 0.54 mg/l.

Mass Balance Equation for Suspended Solids:

Gauge number 19003, at Castlemartyr

Flow of River (95% ile) = 0.033m³/sec

Median SS in River (upstream) = 3.0mg/l

Average volume of discharge = 0.003 m³/sec

Median value for SS in discharge = 18.5mg/l

$$C_{\text{final}} = \frac{(0.033 \times 3.0) + (0.003 \times 18.5)}{(0.033 + 0.003)}$$

C_{final} = 4.29 mg/l Suspended Solids

The increase in Suspended Solids due to the discharge of Mogeely WWTP is 1.29mg/l.

Mass Balance Equation for Total Phosphates:

Gauge number 19003, at Castlemartyr

Median Flow of River (station n. 19003) = 0.465881m³/sec

Median TPO₄-P in River (upstream) = 0.05mg/l

Average volume of discharge = 0.003 m³/sec

Median value for TPO₄-P in discharge = 1.84mg/l

$$C_{\text{final}} = \frac{(0.465881 \times 0.05) + (0.003 \times 1.84)}{(0.465881 + 0.003)}$$

C_{final} = 0.061 mg/l Total Phosphates

The increase in Total Phosphates due to the discharge of Mogeely WWTP is 6.1 mg/l.

Mass Balance Equation for Total Nitrogen:

Gauge number 19003, at Castlemartyr

Flow of River (95% ile) = 0.033m³/sec

Median Total Nitrogen in River (upstream) = 5.39mg/l

Average volume of discharge = 0.003 m³/sec

Median value for Total Nitrogen in discharge = 37.8mg/l

$$C_{\text{final}} = \frac{(0.033 \times 5.39) + (0.003 \times 37.8)}{(0.033 + 0.003)}$$

C_{final} = 8.09 mg/l Total Nitrogen

The increase in Total Nitrogen due to the discharge of Mogeely WWTP is 2.7 mg/l.

Mass Balance Equation for Sulphates:

Gauge number 19003, at Castlemartyr

Flow of River (95% ile) = 0.033m³/sec

Median Sulphates in River (upstream) = 30.0mg/l

Average volume of discharge = 0.003 m³/sec

Median value for Sulphates in discharge = 43.1mg/l

$$C_{\text{final}} = \frac{(0.033 \times 30.0) + (0.003 \times 43.1)}{(0.033 + 0.003)}$$

C_{final} = 31.09 mg/l Sulphates

The increase in Sulphates due to the discharge of Mogeely WWTP 1.09mg/l.

Mass Balance Equation for Ammonia - N:

Gauge number 19003, at Castlemartyr

Flow of River (95% ile) = 0.033m³/sec

Median Ammonia in River (upstream) = 0.1mg/l

Average volume of discharge = 0.003 m³/sec
 Median value for Ammonia in discharge = 0.6mg/l

$$C_{\text{final}} = \frac{(0.033 \times 0.1) + (0.003 \times 0.6)}{(0.033 + 0.003)}$$

C_{final} = 0.142 mg/l Total Ammonia

The increase in Ammonia due to the discharge of Mogeely WWTP is 0.042 mg/l.

The figure for the 50%ile flow was taken from data supplied by the SWRBD flow statistics. The 95%ile were calculated by the EPA using data obtained from station 19003.

- o 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
		✓

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
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

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. 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.

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).

Analysis of the effluent by both Cork County Council and the Private Operator in 2009, indicates that the discharge is in accordance with the Urban Waste Water Treatment Directive Standards for BOD, COD and Suspended Solids. Details of compliance are outlined in **Section F1**

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
		✓

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.

There was a consistent trend recorded by the EPA with respect to the four monitoring stations on the Kiltia River (0300, 0500, 0700, 1000). Q-values recorded in station 0700 over 1999 and 2008 did not change. The three upstream stations on the Kiltia River were satisfactory in 2005, and only Castlemartyr exhibited reduced water

quality. The EPA noted in 2002 that deleterious discharges at two locations influenced water quality. The results from these stations upstream and downstream of Mogeely WWTP discharge point are outlined in **Table G.2.1**.

Station	Location	1989	1994	1997	1999	2002	2005	2008
0700	Second Br N of Mogeely	4	4	4-5	4	4	4	4
1000	Br in Castlemartyr	3-4	4	3-4	3	3-4	3-4	3-4

Table G.2.1.

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
		✓

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.

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

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
		✓

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.

The storm water overflow discharges storm water to the Kiltha River via the primary discharge point from the existing WWTP.

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
		✓

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SECTION H: DECLARATION

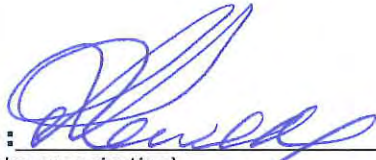
Declaration

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 :  **Date :** June 17th 09
(on behalf of the organisation)

Print signature name: P. POWER

Position in organisation: D.O.S.

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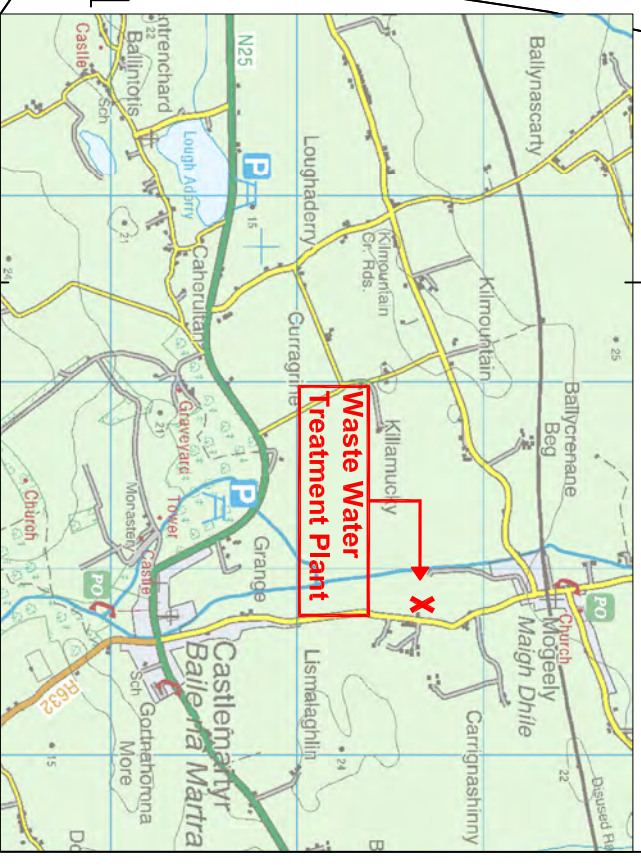
ATTACHMENTS TABLE OF CONTENTS		
ATTACHMENTS	ITEM	TITLE
A.1	Map 1	Location Plan of WWTP
A.1	Map 2	Location of WWTP
B.1	Map 3	Agglomeration Boundary
B.2	Map 4	Location of WWTP
B.2	Map 5	Location of Monitoring Points
B.3	Map 6	Location of Primary Discharge Point
B.3	Map 7	Location of Monitoring Points
B.5	Map 8	Storm Water Overflow Points
B.5	Map 9	Location of Monitoring Points
B.8	Text	Newspaper Site Notice & Site Notice
B.8	Map 10	Location of Site Notice
C.1	Dwg 1	Operation Information Requirements
C.1	Dwg 2	Operation Information Section
E.2	Text	Accreditation
E.2	Map 11	Location of Monitoring Points
E.4	Table	Monitoring Results
F.1	Text	Womanagh Catchment Assessment
F.1	Text	Site synopses
F.1	Text	Water Quality Management Plan
Online Data	Table	Online Data

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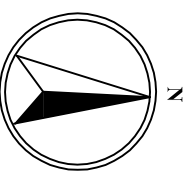
MOGEEELY

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Key Map
Not to Scale



Rev.	Date	By	Description

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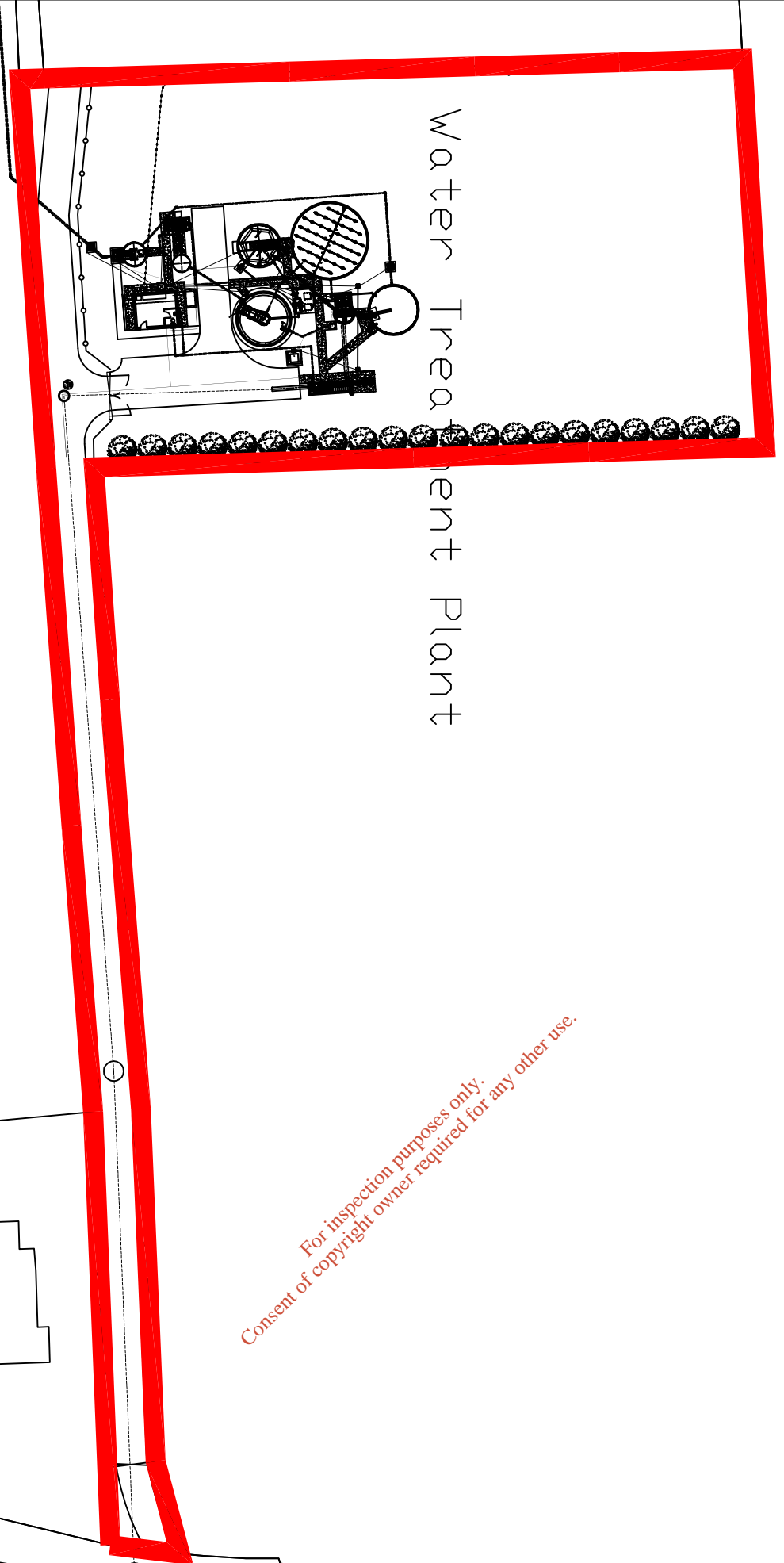
Niall O'Keefe, B.E. C.Eng. Eur. Ing. F.I.E.I.N.I.C.E.
County Engineer
County Hall, Cork.
Páircis Power,
Director of Services,
Area Operations South

Project: **MOGEEELY WWTP**
WASTE WATER
DISCHARGE LICENCE APPLICATION

Title: **Application Form**
Attachment A1 Map1
Location Plan of Waste Water Treatment Plant

Designed: ER	Checked: MH	Scale: 1:750 @ A3	Drawing No: A1_Map1
Drawn: MM	Approved: MH	Date: April 09	Rev: 0
File Path:	Status: —		

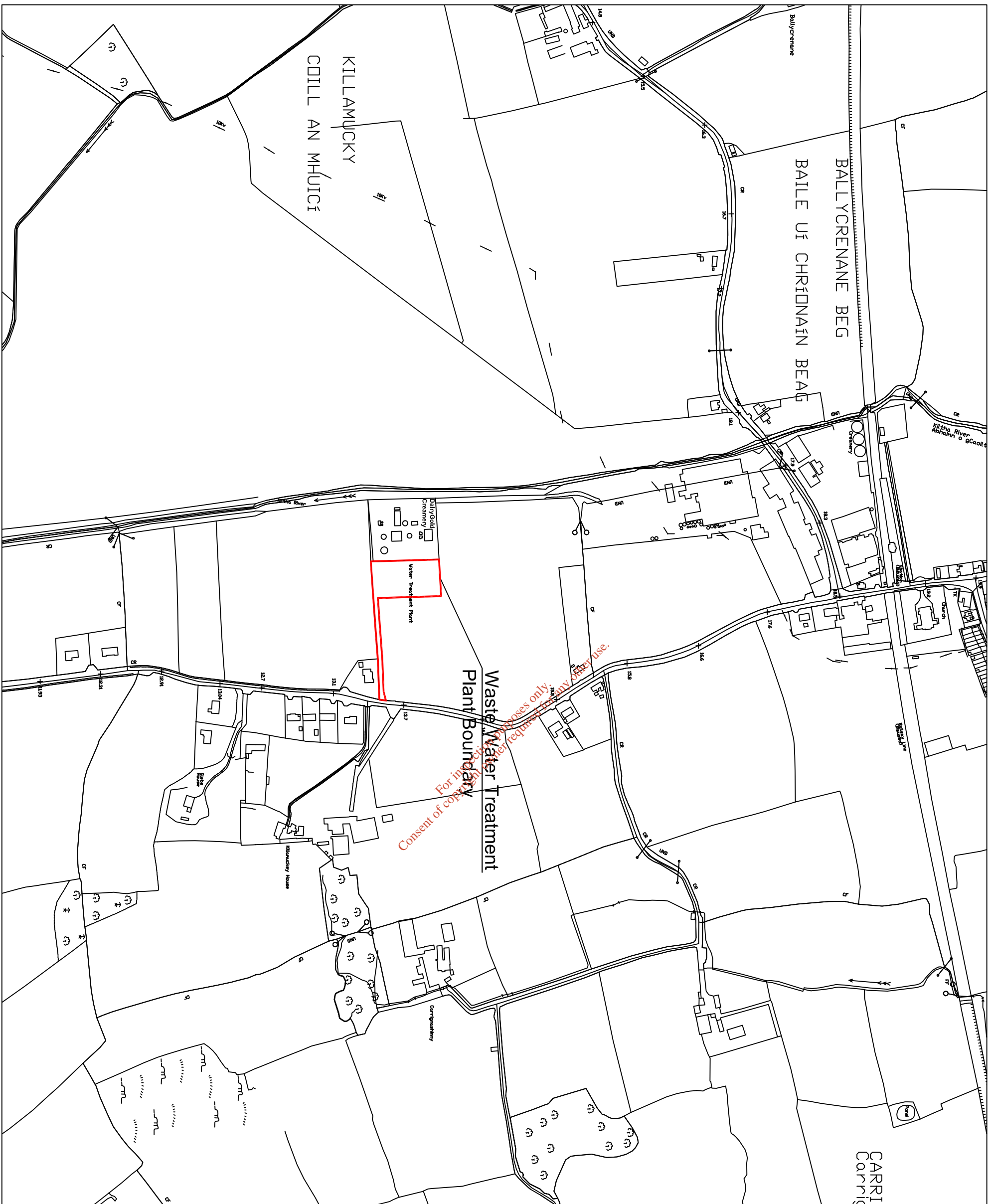
Water Treatment Plant



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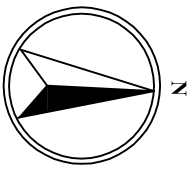
CASTLEMARTYR

13,1



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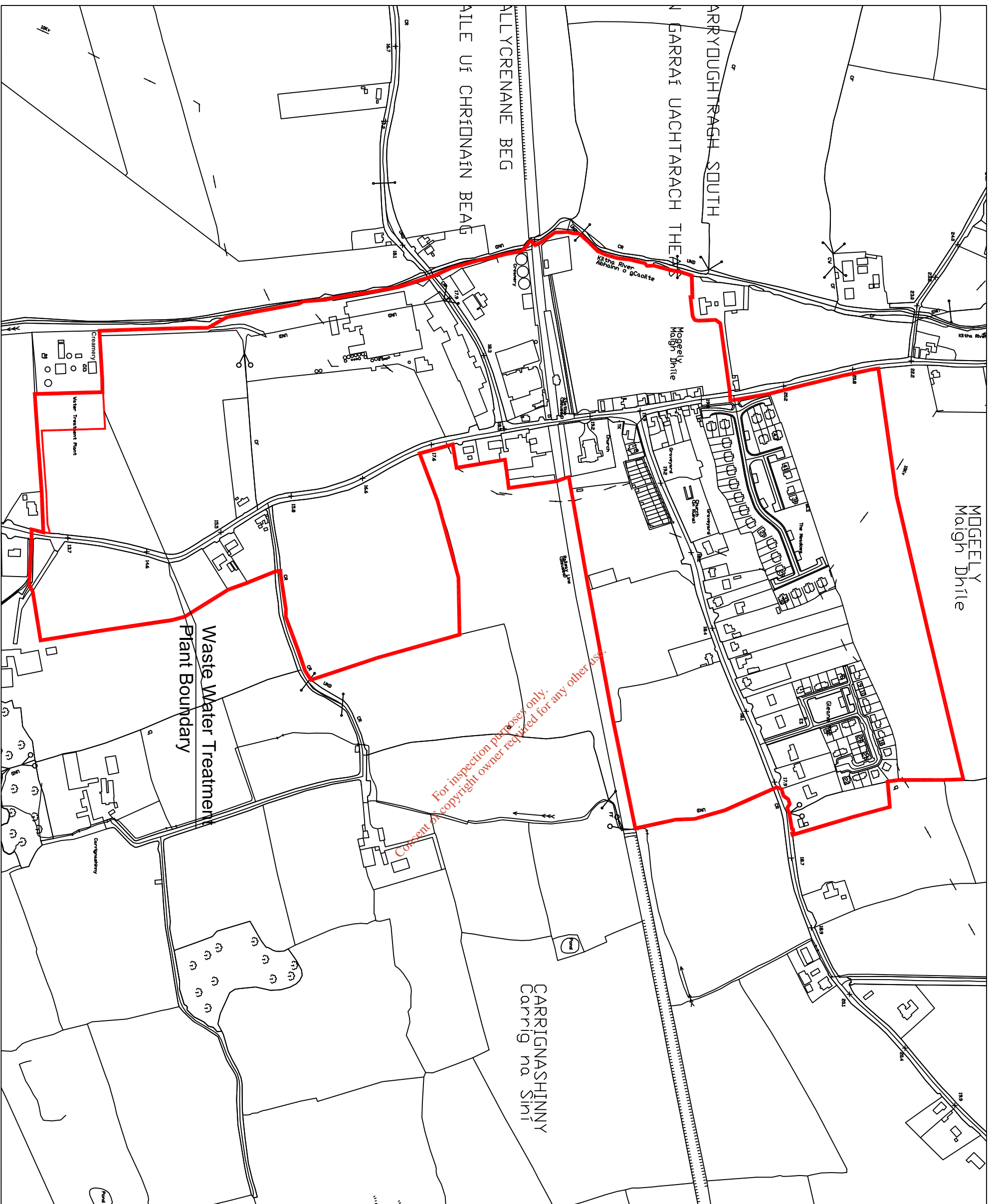
CORK COUNTY COUNCIL
SOUTHERN DIVISION
 Noel O'Keefe, B.E. C.Eng. Furling F.E.L.N.I.C.E.
 County Engineer
 County Hall, Cork.
 Patricia Power,
 Director of Services,
 Area Operations South

Project: **MOGEELY WWTP**
WASTE WATER
DISCHARGE LICENCE APPLICATION

Title: **Application Form**
Attachment A1_Map2
Location of Waste Water Treatment Plant

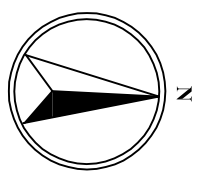
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File Path:			Rev: 0

Rev	Date	By	Description




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AGGLOMERATION BOUNDARY



Rev#	Date	By	Description



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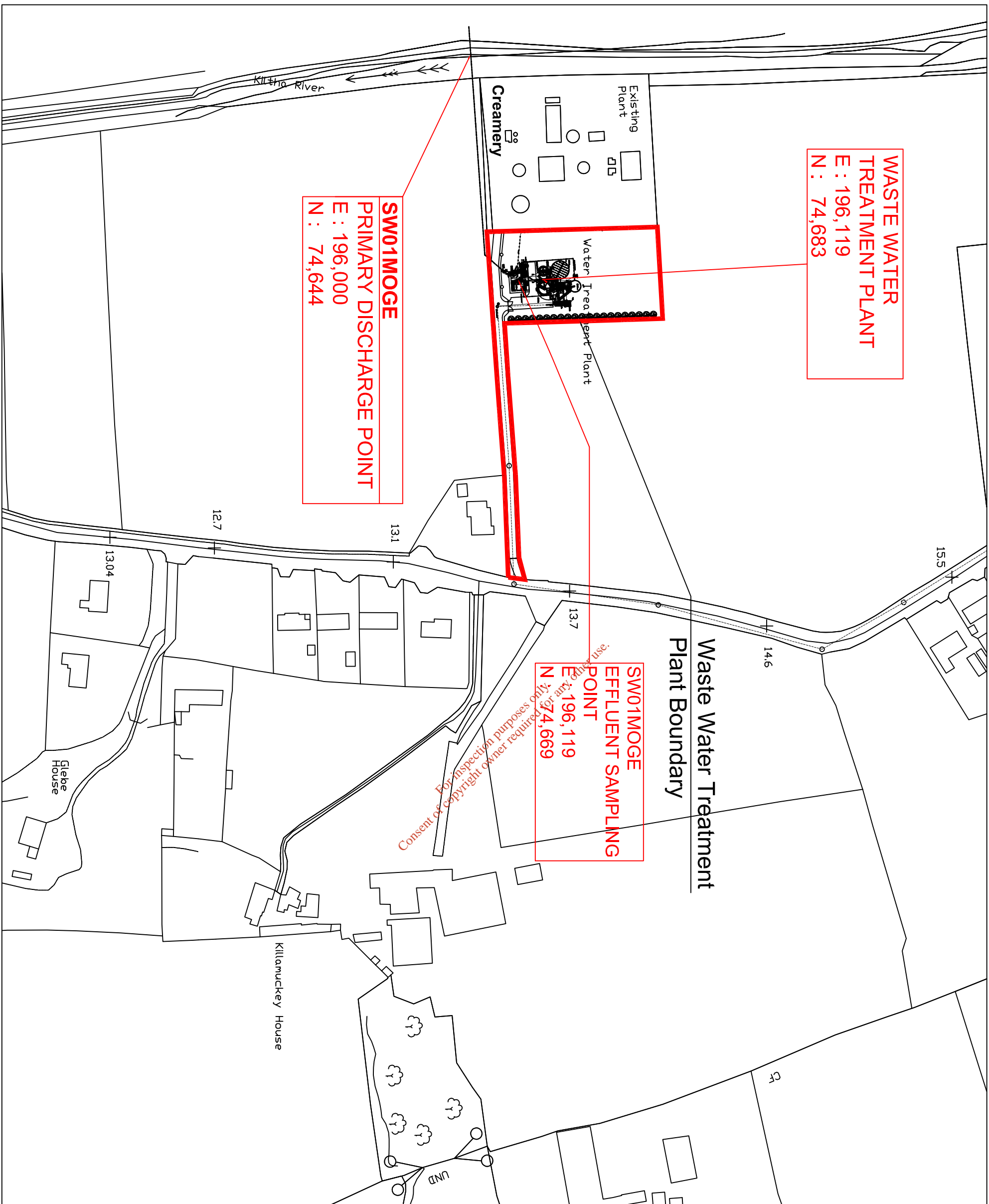
Noel O'Keefe, B.E. CEng, Eur Ing F.I.E.M.C.E.
County Engineer
County Hall, Cork

Patricia Power,
Director of Services,
Asset Operations South

Project: MOGEELY WWTP
WASTE WATER
DISCHARGE LICENCE APPLICATION

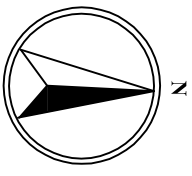
Title: Application Form
Attachment B1 Map3
Agglomeration Boundary Served By
Waste Water Treatment Works

Designed: ER	Checked: MH	Scale: 1:5,000 @ A3	Drawing No: B1_Map3
Drawn: MM	Approved: MH	Date: Mar '09	Sum: — Rev: 0




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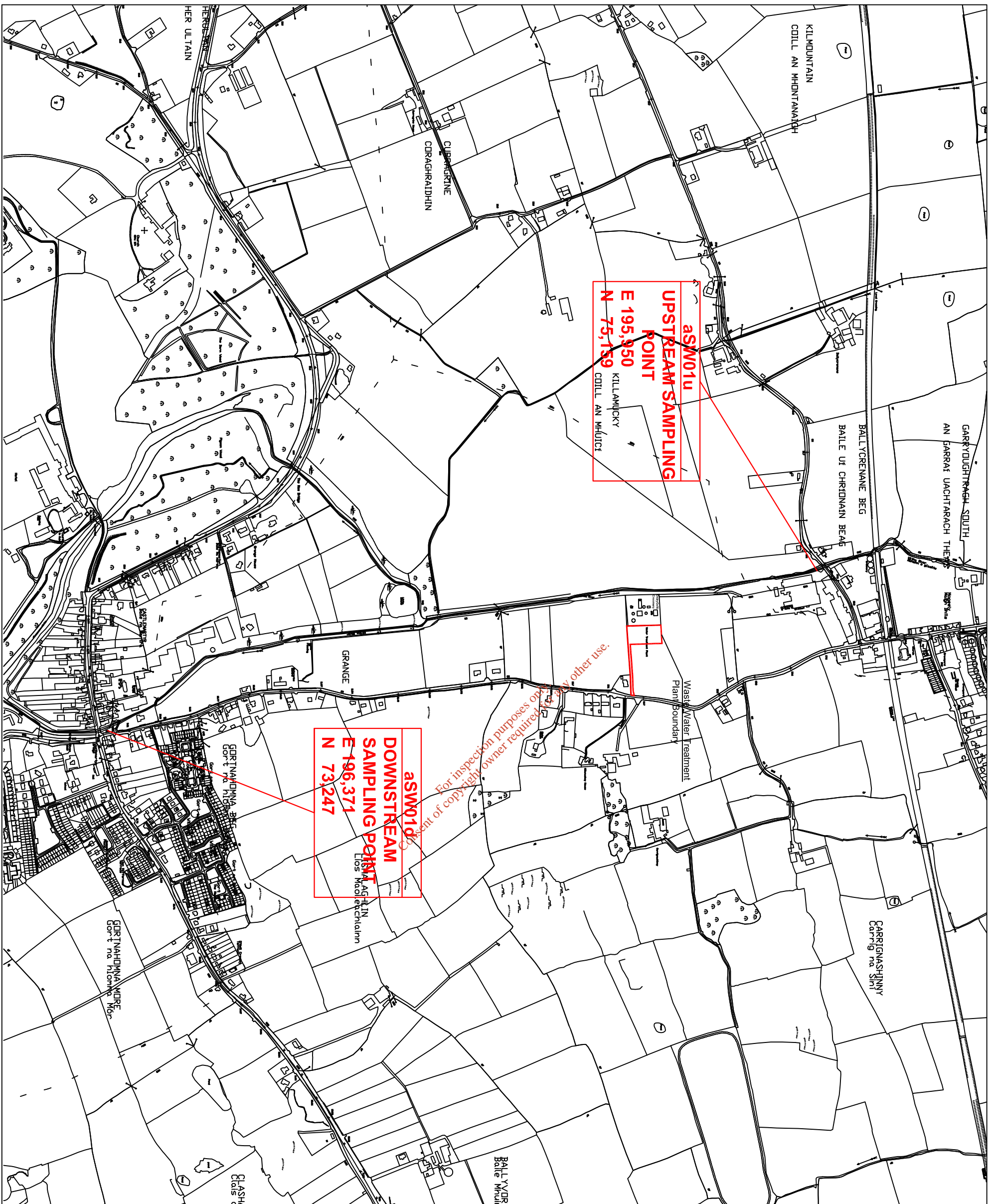
Rev. No.	Date	By	Description


CORK COUNTY COUNCIL
SOUTHERN DIVISION
 Noel O'Keefe, B.E. C.Eng. Furling F.F.E.I.N.C.E.
 County Engineer
 County Hall, Cork.
 Patricia Power,
 Director of Services,
 Area Operations South

Project: **MOGEELY WWTP**
WASTE WATER
DISCHARGE LICENCE APPLICATION

Title: **Application Form**
Attachment B2_Map4
Location of Waste Water Treatment Plant

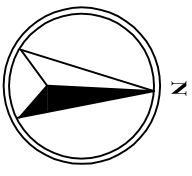
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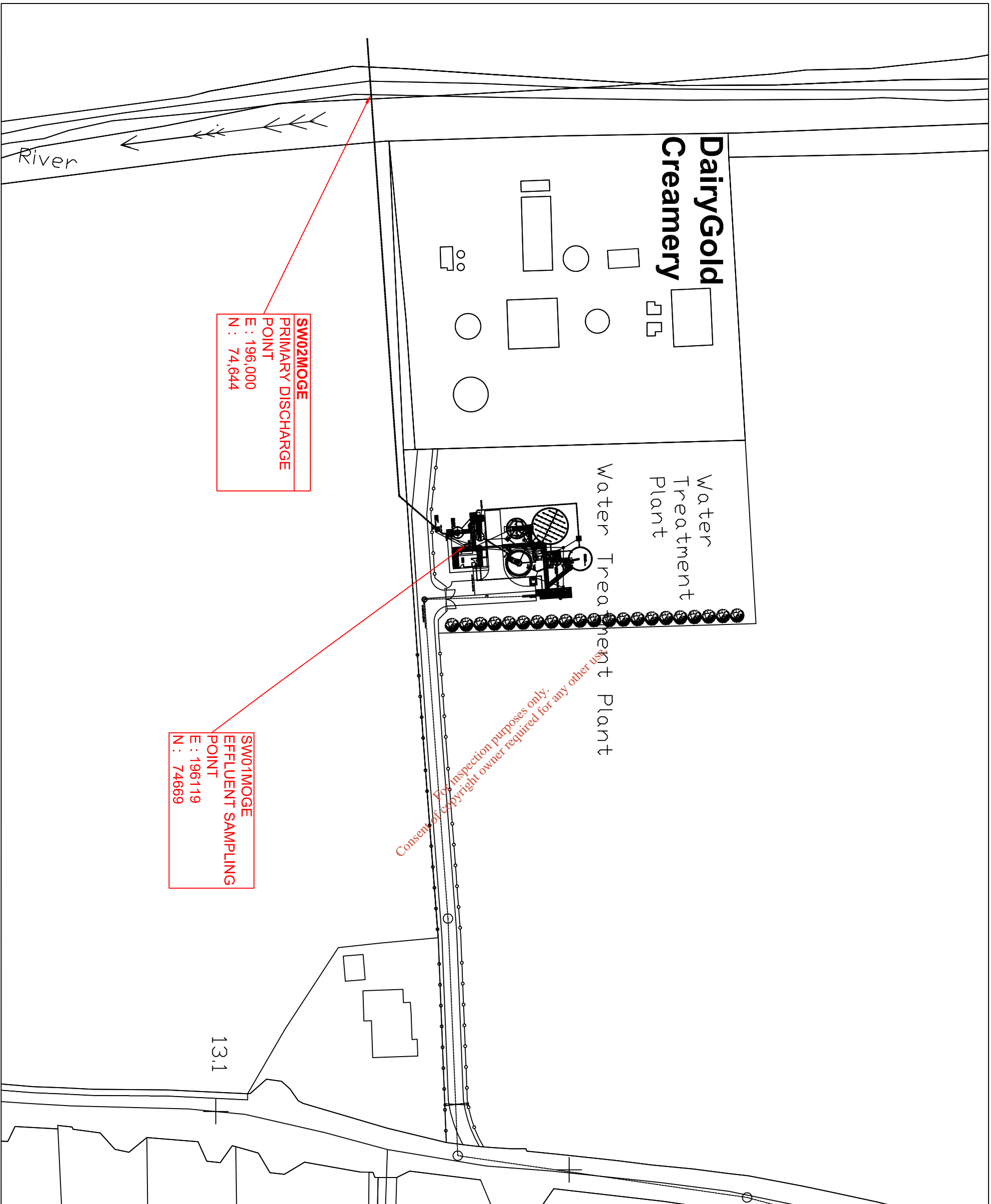


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SOUTHERN DIVISION
Niall O'Keefe, B.E. C.Eng. Eur. Ing. F.I.E.I.N.C.E.
County Engineer
County Hall, Cork.
Patricia Power,
Director of Services,
Asset Operations South

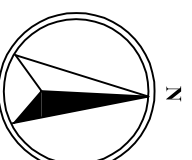
Project: MOGEELY WWTP
WASTE WATER
DISCHARGE LICENCE APPLICATION

Title: Application Form
Attachment B2, Maps
Location of Upstream & Downstream Monitoring Points


Designed:	ER	Checked:	MH	Scale:	1:10,000 @ A3	Drawing No:	B2_Maps
Drawn:	MM	Approved:	MH	Date:	April 09	Status:	Rev: 0
File Path:							



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Rev	Date	By	Description



CORK COUNTY COUNCIL
SOUTHERN DIVISION

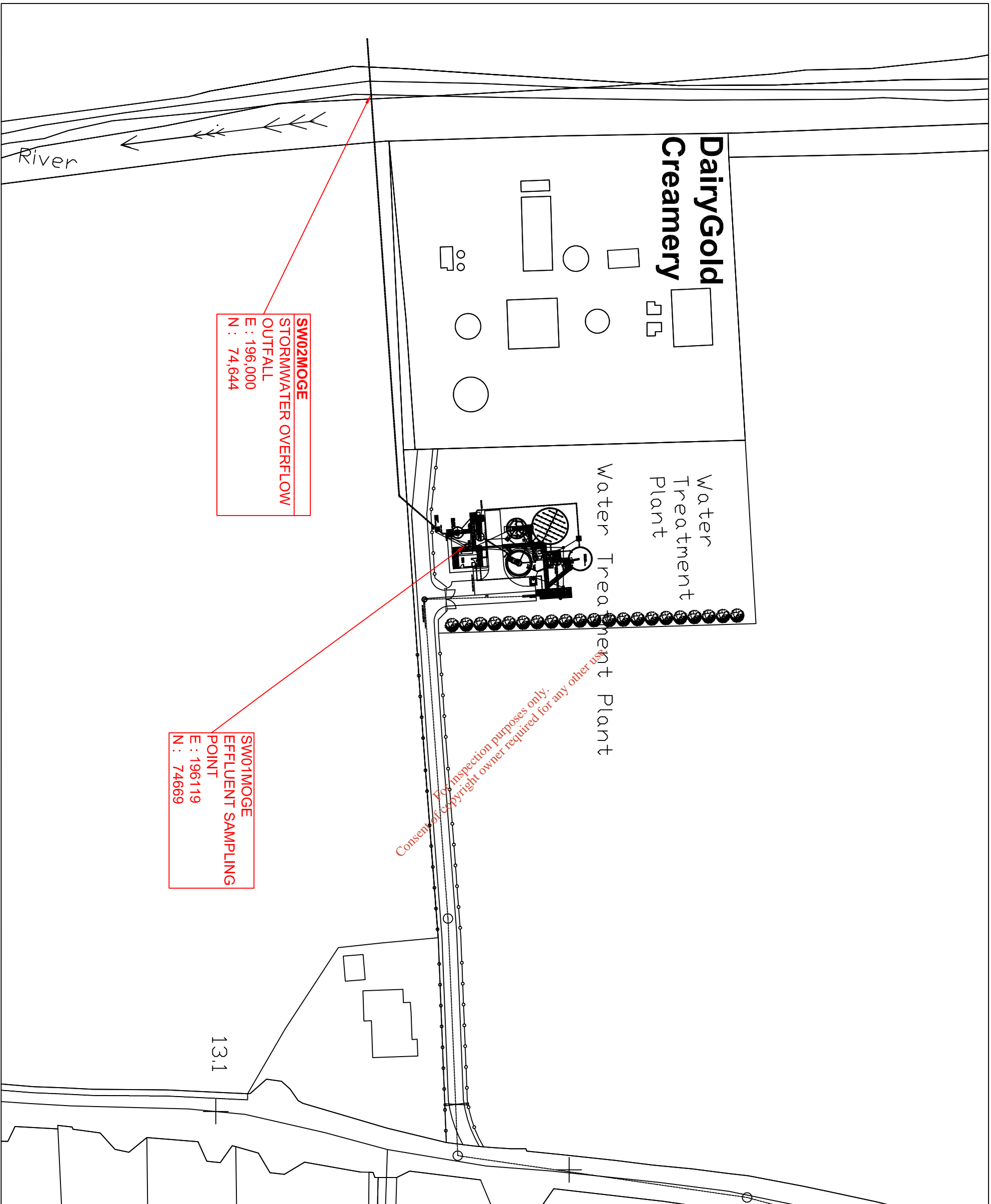
Noel O'Keefe, B.E. CEng, Eurling FLEINICE
County Engineer
County Hill, Cork

Patricia Power,
Director of Services,
Area Operations South

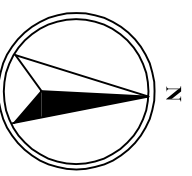
Project: MOGEEELY WWTP
WASTE WATER
DISCHARGE LICENCE APPLICATION

Title: Application Form
Attachment B3, Map6
Location of Primary Discharge Point


Designed: ER	Checked: MH	Scale: 1:1000 @ A3	Drawing No: B3_Map6
Drawn: MM	Approved: MH	Date: April '09	
File Path:	Summ: —	Rev: 0	



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SOUTHERN DIVISION

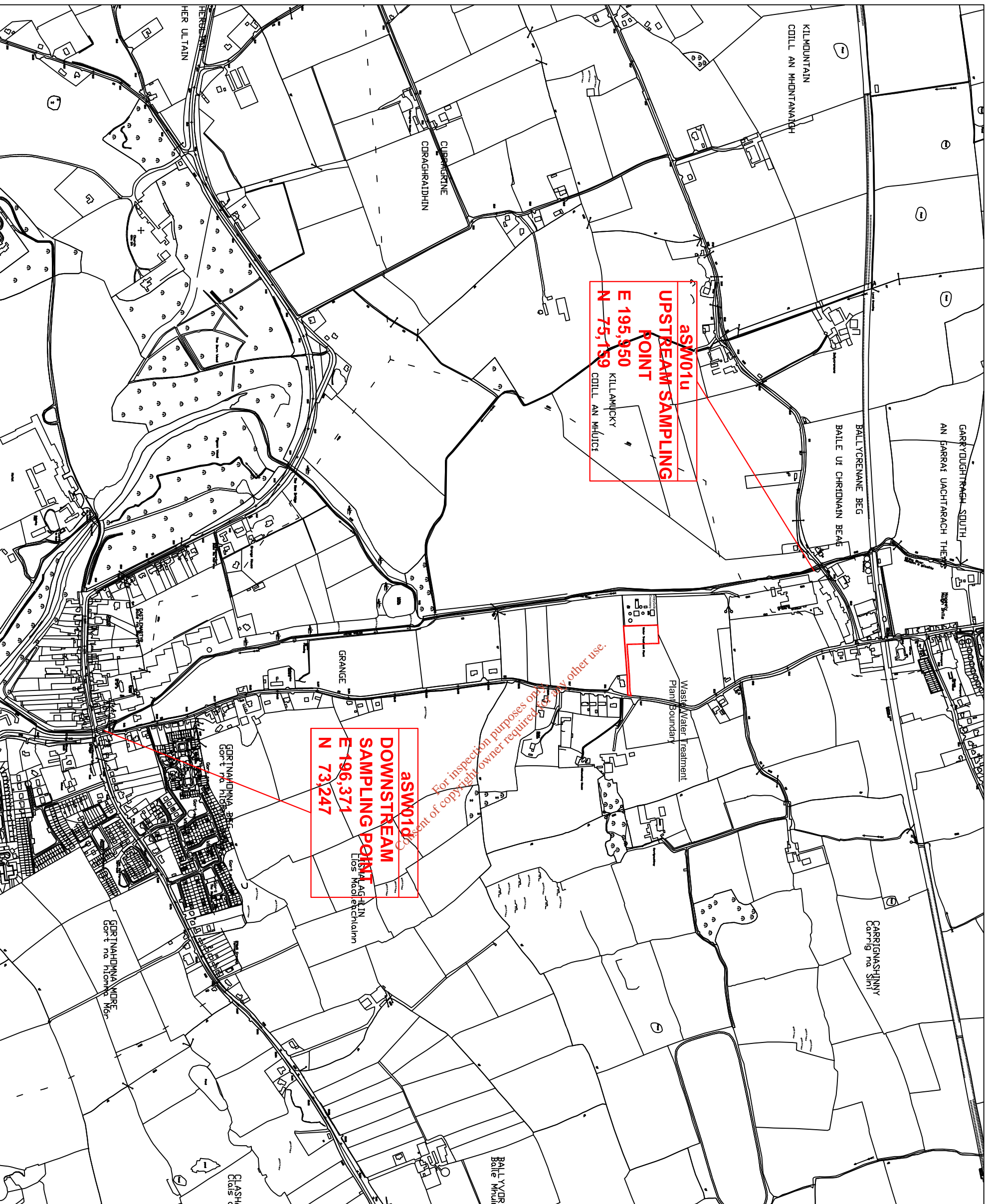
Noel O Keefe, B.E. CEng, Eurling FLEINICE
County Engineer
County Hall, Cork

Patricia Power,
Director of Services,
Area Operations South

Project: MOGEEELY WWTP
WASTE WATER
DISCHARGE LICENCE APPLICATION

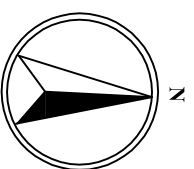
Title: Application Form
Attachment B5, Map8
Location of Storm Water Overflow Points

Designed: ER	Checked: MH	Scale: 1:1000 @ A3	Drawing No: B5_Map8
Drawn: MM	Approved: MH	Date: April '09	Rev: 0
File Path:			



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SOUTHERN DIVISION**

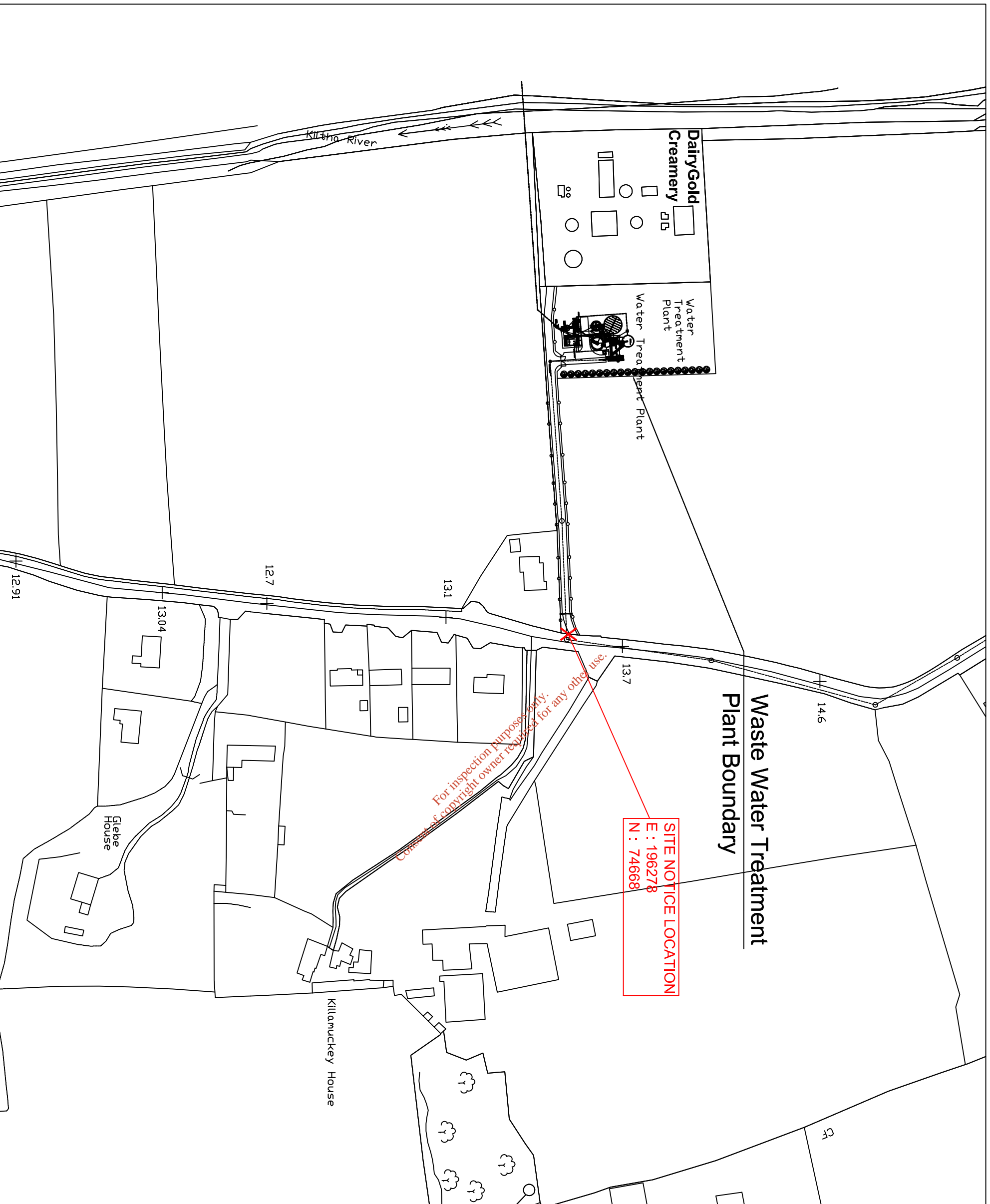
Niall O'Keefe, B.E. C.Eng. Eur. Ing. F.I.E.I.N.C.E.
County Engineer,
County Hall, Cork.
Patricia Power,
Director of Services,
Asset Operations South

Project:
MOGEELY WWTP
WASTE WATER
DISCHARGE LICENCE APPLICATION

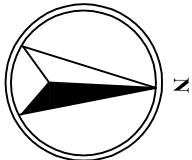
Title:
Application Form
Attachment B5_Map9
Location of Upstream & Downstream Monitoring Points

Designed:	ER	Checked:	MH	Scale:	1:10,000 @ A3	Drawing No:	B5_Map9
Drawn:	MM	Approved:	MH	Date:	April 09	Status:	Rev: 0
File Path:							


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CORK COUNTY COUNCIL
 SOUTHERN DIVISION
Niall O'Keefe, B.E. C.Eng. F.R.I.A.C.I.E.
 County Engineer
 County Hall, Cork.
Patricia Power,
 Director of Services,
 Area Operations South

Project: **MOGEELY WWTP
 WASTE WATER
 DISCHARGE LICENCE APPLICATION**

Title: **Application Form
 Attachment B8_Map10
 Location of Site Notice**

Designed: ER	Checked: MH	Scale: 1:2,000 @ A3	Drawing No: B8_Map10
Drawn: MM	Approved: MH	Date: April '09	Sheet: 0
File Path:			

Newspaper Advertisement

Cork County Council Southern Division

**APPLICATION TO THE ENVIRONMENTAL
PROTECTION AGENCY FOR A WASTEWATER
DISCHARGE LICENCE**

In accordance with the Waste Water Discharge (Authorisation) Regulations 2007, Water Services Southern Division of Cork County Council, Carrigrohane Road, Cork is applying to the Environmental Protection Agency for a Waste Water Discharge Licence for the Agglomeration of Mogeely at the following locations:

Plant Name	Location	National Grid Ref.
Mogeely WWTP	Killamucky, Mogeely	E 196119 N 074683

Discharge	Function	Townland	Receptor	Grid Reference
Primary	Main	Mogeely	Kiltha	E 196000 N 074644

A copy of the application for the Waste Water Discharge Licence and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the Application shall as soon as is practicable after receipt by the Agency be available for inspection or purchase at the

- **Environmental Protection Agency, PO Box 3000, Johnstown Castle Estate, Co. Wexford, Lo Call 1890 335599 Telephone: 053-9160600 Fax: 053-9160699 Email:info@epa.ie**

and at

- **Cork County Council Offices, Water Services South, County Hall, Carrigrohane Road, Co. Cork, Telephone: 021 - 4276891 Fax: 021 - 4276321.**

Submissions in relation to the application may be made to the Environmental Protection Agency at its headquarters described above

Cork County Council Southern Division



CORK COUNTY COUNCIL

SITE NOTICE

APPLICATION TO THE ENVIRONMENTAL PROTECTION AGENCY FOR A WASTEWATER DISCHARGE LICENCE

In accordance with the Waste Water Discharge (Authorisation) Regulations 2007, Water Services Southern Division of Cork County Council, Carrigrohane Road, Cork is applying to the Environmental Protection Agency for a Waste Water Discharge Licence for the Agglomeration of Ladysbridge at the following locations:

Plant Name	Location	National Grid Ref.
Mogeely WWTP	Killamucky, Mogeely	E 196119 N 074683

Discharge	Function	Townland	Receptor	Grid Reference
Primary	Main	Mogeely	Kiltha	E 196000 N 074644

A copy of the application for the Waste Water Discharge Licence and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the Application shall as soon as is practicable after receipt by the Agency be available for inspection or purchase at the

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and at

- **Cork County Council Offices, Water Services South, County Hall, Carrigrohane Road, Co. Cork, Telephone: 021 - 4276891 Fax: 021 - 4276321.**

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Cork County Council Southern Division



CORK COUNTY COUNCIL

SITE NOTICE

APPLICATION TO THE ENVIRONMENTAL PROTECTION AGENCY FOR A WASTEWATER DISCHARGE LICENCE

In accordance with the Waste Water Discharge (Authorisation) Regulations 2007, Water Services Southern Division of Cork County Council, Carrigrohane Road, Cork is applying to the Environmental Protection Agency for a Waste Water Discharge Licence for the Agglomeration of Mogeely at the following locations:

Plant Name	Location	National Grid Ref.
Mogeely WWTP	Killamucky, Mogeely	E 196119 N 074683

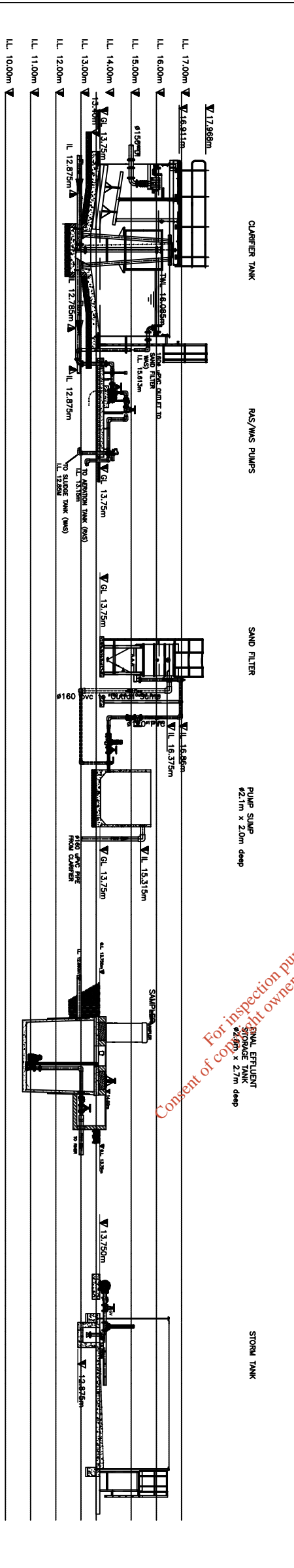
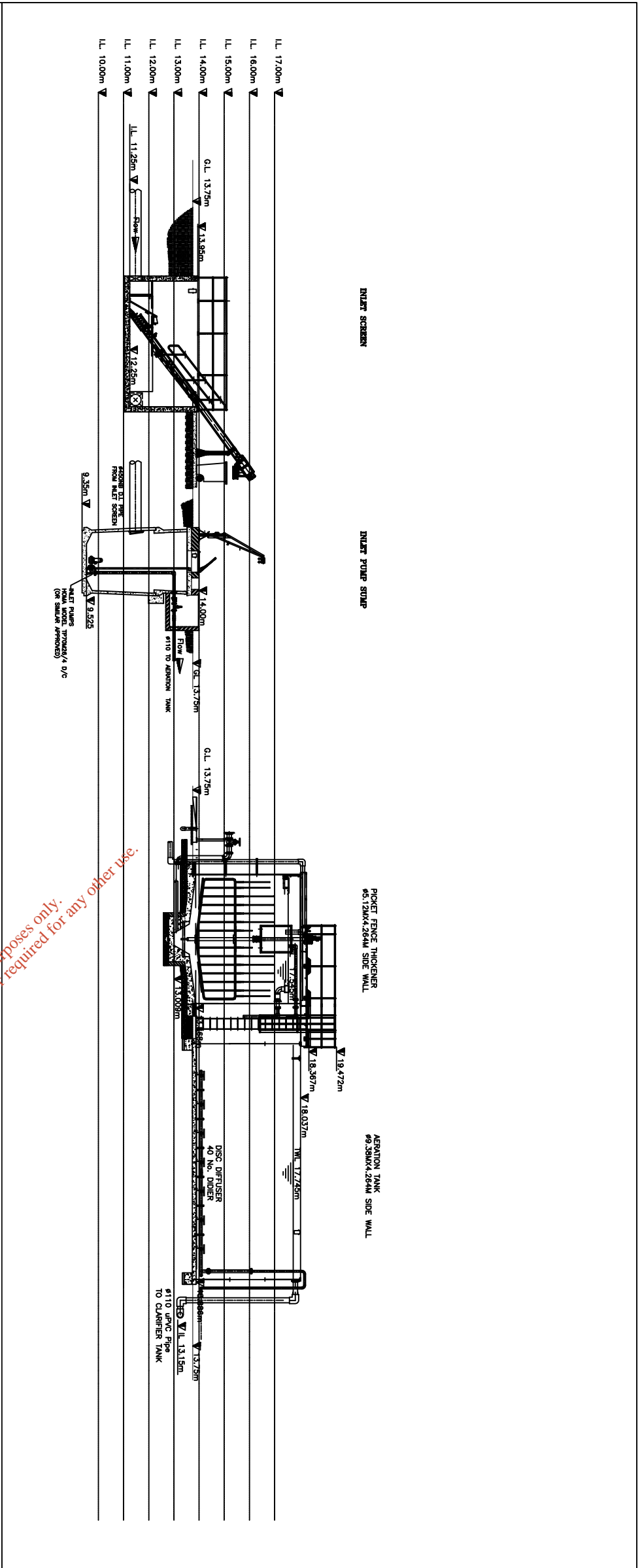
Discharge	Function	Townland	Receptor	Grid Reference
Primary	Main	Mogeely	Kiltha	E 196000 N 074644

A copy of the application for the Waste Water Discharge Licence and such further information relating to the application as may be furnished to the Agency in the course of the Agency's consideration of the Application shall as soon as is practicable after receipt by the Agency be available for inspection or purchase at the

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and at

- **Cork County Council Offices, Water Services South, County Hall, Carrigrohane Road, Co. Cork, Telephone: 021 - 4276891 Fax: 021 - 4276321.**

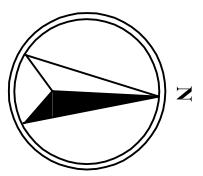
Submissions in relation to the application may be made to the Environmental Protection Agency at its headquarters described above




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Rev	Date	By	Description


CORK COUNTY COUNCIL
 SOUTHERN DIVISION
Noel O'Keefe, B.E. Chief Executive
 County Engineer
 County Hall, Cork
Patricia Power,
 Director of Services,
 Area Operations South

Project: **MOGEELEY WWTP
WASTE WATER
DISCHARGE LICENCE APPLICATION**

Title: **Application Form
Attachment C1_Dwg 02
Operation Information Section**

Designed: ER	Checked: MH	Scale: N.T.S.	Drawing No: C1_Dwg02
Drawn: MM	Approved: MH	Date: April 09	
File Path:	Summs: —	Rev: 0	

Accreditation Certificate

Cork County Council

Wastewater Testing Laboratory, Inniscarra, Co. Cork

Testing Laboratory

Registration number: 016T

is accredited by the Irish National Accreditation Board (INAB) to undertake testing as detailed in the Schedule bearing the Registration Number detailed above, in compliance with the International Standard ISO/IEC 17025:2005 2nd Edition "General Requirements for the Competence of Testing and Calibration Laboratories" (This Certificate must be read in conjunction with the Annexed Schedule of Accreditation)

Date of award of accreditation: 01:10:2002

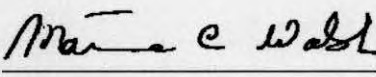
Date of last renewal of accreditation: 20:09:2007

Expiry date of this certificate of accreditation: 01:10:2012

This Accreditation shall remain in force until further notice subject to continuing compliance with INAB accreditation criteria, ISO/IEC 17025 and any further requirements specified by the Irish National Accreditation Board.

Manager: 

Mr Tom Dempsey

Chairperson: 

Dr Máire Walsh

Issued on 23 June 2008

Organisations are subject to annual surveillance and are re-assessed every five years. The renewal date on this Certificate confirms the latest date of renewal of accreditation. To confirm the validity of this Certificate, please contact the Irish National Accreditation Board.

The INAB is a signatory of the European co-operation for Accreditation (EA) Testing Multilateral Agreement (MLA) and the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement.

Schedule of Accreditation



(Annex to Accreditation Certificate)

Permanent Laboratory:
Category A

CORK COUNTY COUNCIL

Chemistry Testing Laboratory

Initial Registration Date : 25-April-1991
Postal Address: Waste Water Laboratory
(Address of other locations as they apply) Inniscarra
Co. Cork
Telephone: +353 (21) 4532700
Fax: +353 (21) 4532777
E-mail:
Contact Name: Ms M Cherry
Facilities: Normally not available for Public testing

Schedule of Accreditation



Permanent Laboratory:
Category A

THE IRISH NATIONAL ACCREDITATION BOARD (INAB) is the Irish body for the accreditation of organisations including laboratories.

Laboratory accreditation is available to testing and calibration facilities operated by manufacturing organisations, government departments, educational institutions and commercial testing/calibration services. Indeed, any organisation involved in testing, measurement or calibration in any area of technology can seek accreditation for the work it is undertaking.

Each accredited laboratory has been assessed by skilled specialist assessors and found to meet criteria which are in compliance with ISO/IEC 17025 or ISO/IEC 15189 (medical laboratories). Frequent audits, together with periodic inter-laboratory test programmes, ensure that these standards of operation are maintained.

Testing and Calibration Categories:

- Category A:** Permanent laboratory calibration and testing where the laboratory is erected on a fixed location for a period expected to be greater than three years.
- Category B:** Site calibration and testing that is performed by staff sent out on site by a permanent laboratory that is accredited by the Irish National Accreditation Board.
- Category C:** Site calibration and testing that is performed in a site/mobile laboratory or by staff sent out by such a laboratory, the operation of which is the responsibility of a permanent laboratory accredited by the Irish National Accreditation Board.
- Category D:** Site calibration and testing that is performed on site by individuals and organisations that do not have a permanent calibration/testing laboratory. Testing may be performed using
- (a) portable test equipment
 - (b) a site laboratory
 - (c) a mobile laboratory or
 - (d) equipment from a mobile or site laboratory

Standard Specification or Test Procedure Used:

The standard specification or test procedure that is accredited is the issue that is current on the date of the most recent visit, unless otherwise stated.

Glossary of Terms

Facilities:

- Public calibration/testing service:** Commercial operations which actively seek work from others.
- Conditionally available for public calibration/testing:** Established for another primary purpose but, more commonly than not, is available for outside work.
- Normally not available for public calibration/testing:** Unavailable for public calibration/testing more often than not.

Laboratory users wishing to obtain assurance that calibration or test results are reliable and carried out to the Irish National Accreditation Board criteria should insist on receiving an accredited calibration certificate or test report. Users should contact the laboratory directly to ensure that this scope of accreditation is current. INAB will, on request, verify the status and scope.

Scope of Accreditation



**Cork County Council
Chemical Testing Laboratory**

Permanent Laboratory:
Category A

INAB Classification number (P9) Materials/products tested	Type of test/properties measured Range of measurement	Standard specifications Equipment/techniques used
766 Waters .01 Waters for domestic purposes <i>Surface and ground waters</i>	Chemical analysis: Biochemical Oxygen Demand 2 - 145,000 mg/l pH 2 - 12 Suspended Solids 0.5 - 17,500 mg/l Chemical Oxygen Demand 21 - 135 mg/l 120 - 670,000 mg/l Total phosphorus 0.2 - 5,300 mg/l Ammonia 0.1 - 1,000 mg/l NH ₃ - N	Documented in-house methods based on Standard Methods for the Examination of Water & Wastewater 21 st Edition APHA (See Note 1) CP No. 1 Membrane electrode CP No. 5 Electrometry CP No. 3 Gravimetric CP No. 6 Reflux - colourmetric method US-EPA Approved method/HACH Method CP No.20 Documented in-house method CP22 by Konelab based on Method for the Examination of Waters and Associated Material HMSO:1981

Scope of Accreditation



**Cork County Council
Chemical Testing Laboratory**

**Permanent Laboratory:
Category A**

INAB Classification number (P9) Materials/products tested	Type of test/properties measured Range of measurement	Standard specifications Equipment/techniques used
766 Waters .01 Waters for domestic purposes <i>Surface and ground waters</i>	<p>Orthophosphate as P (Konelab) Range: 0.005-1.00 mg O-PO4 P/L High Range: 1000 mg O-PO4 P/L Method Detection Limit: 0.02 mg O-PO4 P/L</p> <p>Chloride (Konelab) Range: 25-250 mg/L Cl- High Range Conc.: 25,000 mg/L Cl- Method Detection Limit: 25 mg/L Cl-</p> <p>Sulphate (Konelab) Range: 30-250 mg/L SO4/L High Range Conc.: 35,000 mg/L SO4/L Method Detection Limit: 30 mg SO4/L</p>	<p>CP No. 23 Ascorbic Acid Method</p> <p>CP No. 24 Ferricyanide Method</p> <p>CP No. 25 Documented in-house method by Konelab based on method for the examination of waters and waste waters and associated material HMSO: 1981</p>

Scope of Accreditation



Cork County Council Chemical Testing Laboratory

Permanent Laboratory:
Category A

INAB Classification number (P9) Materials/products tested	Type of test/properties measured Range of measurement	Standard specifications Equipment/techniques used
766 Waters	Chemical analysis	Documented in-house methods based on Standard Methods for the Examination of Water & Wastewater 21 st Edition APHA (See Note 1)
.05 Trade Wastes <i>Industrial effluents</i> <i>Urban Wastewater</i> <i>Municipal Wastewater</i>	Biochemical Oxygen Demand 2 - 145,000 mg/l	CP No. 1 Membrane electrode
	pH 2 - 12	CP No. 5 Electrometry
	Suspended Solids 0.5 - 17,500 mg/l	CP No. 3 Gravimetric
	Chemical Oxygen Demand 21 - 135 mg/l 120 - 670,000 mg/l	CP No. 6 Reflux - colourmetric method
	Total phosphorus 0.2 - 5,300 mg/l	US-EPA Approved method/HACH Method CP No.20
	Ammonia 0.1 - 1,000 mg/l NH3-N	Documented in-house method CP22 by Konelab based on Method for the Examination of Waters and Associated Material HMSO: 1981.

Notes

1. APHA American Public Health Association, USA, 21st Edition

Scope of Accreditation

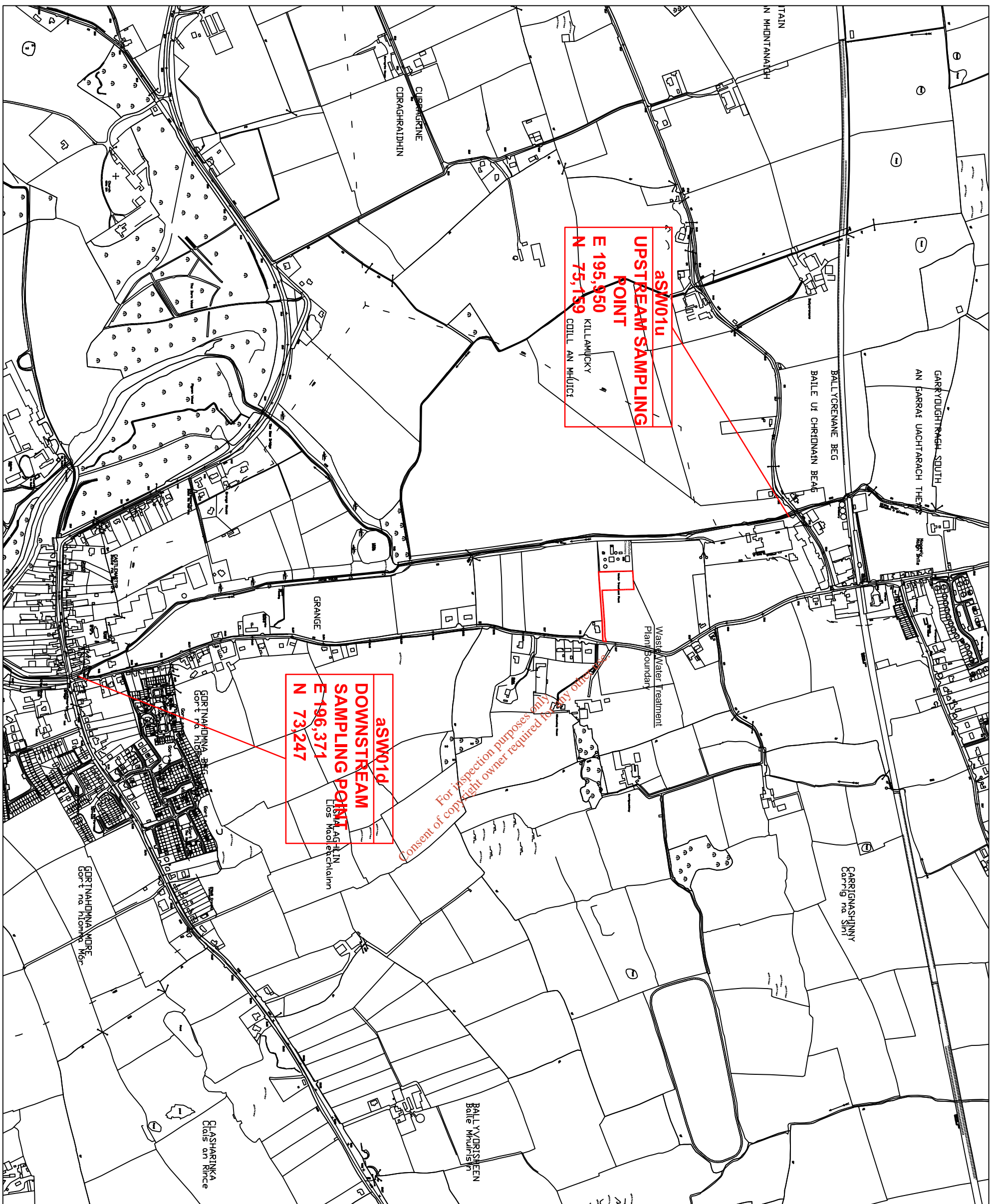


Cork County Council
Chemical Testing Laboratory

Permanent Laboratory:
Category A

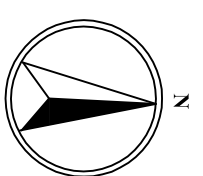
INAB Classification number (P9) Materials/products tested	Type of test/properties measured Range of measurement	Standard specifications Equipment/techniques used
766 Waters	Chemical analysis	Documented in-house methods based on Standard Methods for the Examination of Water & Wastewater 21 st Edition APHA (See Note 1)
.05 Trade Wastes <i>Industrial effluents</i> <i>Urban Wastewater</i> <i>Municipal Wastewater</i>	Orthophosphate as P (Konelab) Range: 0.005 - 1.00 mg O-PO4 P/L High Range: 1000 mg O-PO4 P/L Method Detection Limit: 0.02 mg O-PO4 P/L	CP No. 1 Membrane electrode CP No. 23 Ascorbic Acid Method
	Chloride (Konelab) Range: 25-250 mg /L Cl- High Range Conc.: 86,600 mg /L Cl- Method Detection Limit: 25mg / L Cl-	CP No. 24 Ferricyanide Method
	Sulphate (Konelab)) Range: 30-250 mg /L SO4 /L High Range Conc.: 35,000 mg/L SO4 /L Method Detection Limit: 30 mg SO4 /L	CP No. 25 Documented in-house method by Konelab based on method for the examination of waters and waste waters and associated material HMSO: 1981

Notes
1. APHA American Public Health Association, USA, 21st Edition



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Rev. No.	By	Description

CORK COUNTY COUNCIL
SOUTHERN DIVISION

Niall O'Keefe, B.E. C.Eng. Ian Ing F.I.E.N.C.E.
County Engineer
County Hall, Cork

Patricia Power,
Director of Services,
Area Operations South

Project: MOGEELY WWTP
WASTE WATER
DISCHARGE LICENCE APPLICATION

Title: Application Form
Attachment E2_Map11
Location of Upstream & Downstream
Monitoring Points

Designed:	ER	Checked:	MH	Scale:	1:10,000 @ A3	Drawing No:	E2_Map 11	
Drawn:	MM	Approved:	MH	Date:	April '09	Sheet:	1 of 1	
File Path:							Status:	0

Attachment E4 MOGEELY Inlet Table E4			
Sample Date	02/04/2009	07/05/2009	
Sample	Influent	Influent	Average
Sample Code	GT457	GT643	
Flow M³/Day	*	*	
pH	7.3	7.1	7.2
Temperature °C	*	*	
Cond 20°C	*	708	708
SS mg/L	*	133	133
NH₃ mg/L	*	15.9	15.9
BOD mg/L	*	107	107
COD mg/L	*	299	299
TN mg/L	48.9	51.3	50.1
Nitrite mg/L	*	0.518	0.518
Nitrate mg/L	*	31.362	31.362
TP mg/L	2.93	2.91	2.92
O-PO₄-P mg/L	*	2.83	2.83
SO₄ mg/L	*	44.7	44.7
Phenols µg/L	*	<0.10	<0.10
Atrazine µg/L	*	<0.01	<0.01
Dichloromethane µg/L	*	<1	<1
Simazine µg/L	*	<0.01	<0.01
Toluene µg/L	*	<0.28	<0.28
Tributyltin µg/L	*	not required	not required
Xylenes µg/L	*	<1	<1
Arsenic µg/L	*	<0.96	<0.96
Chromium ug/L	<20	<20	<20
Copper ug/L	46.6	156	101.3
Cyanide µg/L	*	<5	<5
Fluoride µg/L	*	<100	<100
Lead ug/L	<20	<20	<20
Nickel ug/L	<20	<20	<20
Zinc ug/L	238.7	682	460.35
Boron ug/L	50.3	<20	50.3
Cadmium ug/L	<20	<20	<20
Mercury µg/L	*	<0.2	<0.2
Selenium µg/L	*	1.2	1.2
Barium ug/L	<20	<20	<20

Attachment E4 MOGEELY Discharge Outlet Table E4

Sample Date	02/04/2009	07/05/2009	
Sample	Effluent	Effluent	Average
Sample Code	GT456	GT644	
Flow M ³ /Day	*	*	
pH	7.1	6.1	6.6
Temperature °C	*	*	
Cond 20°C	*	620	620
SS mg/L	9	28	18.5
NH ₃ mg/L	*	0.6	0.6
BOD mg/L	3	14	8.5
COD mg/L	28	91	59.5
TN mg/L	29.9	45.7	37.8
Nitrite mg/L	*	<0.10	<0.10
Nitrate mg/L	*	44.4	44.4
TP mg/L	0.10	1.45	0.78
O-PO ₄ -P mg/L	*	1.84	1.84
SO ₄ mg/L	*	43.1	43.1
Phenols µg/L	*	<0.10	<0.10
Atrazine µg/L	*	<0.01	<0.01
Dichloromethane	*	<1	<1
Simazine µg/L	*	<0.01	<0.01
Toluene µg/L	*	<0.28	<0.28
Tributyltin µg/L	*	not required	not required
Xylenes µg/L	*	<1	<1
Arsenic µg/L	*	<0.96	<0.96
Chromium ug/L	<20	<20	<20
Copper ug/L	<20	90	90
Cyanide µg/L	*	<5	<5
Fluoride µg/L	*	<100	<100
Lead ug/L	<20	<20	<20
Nickel ug/L	<20	<20	<20
Zinc ug/L	420.2	763	591.6
Boron ug/L	81.1	<20	81.1
Cadmium ug/L	<20	<20	<20
Mercury µg/L	*	<0.2	<0.2
Selenium µg/L	*	1.7	1.7
Barium ug/L	20.9	27	23.95

Attachment E4 MOGEELY Upstream Table E4

Sample Date	07/05/2009	
Sample	River	Average
Sample Code	GT642	
Flow M ³ /Day	*	*
pH	7.9	7.9
Temperature °C	*	*
Cond 20°C	210	210
SS mg/L	3	3
NH ₃ mg/L	<0.1	<0.1
BOD mg/L	2	2
COD mg/L	<21	<21
TN mg/L	5.39	5.39
Nitrite mg/L	<0.10	<0.10
Nitrate mg/L	5.71	5.71
TP mg/L	<0.05	<0.05
O-PO ₄ -P mg/L	<0.05	<0.05
SO ₄ mg/L	<30	<30
Phenols µg/L	<0.10	<0.10
Atrazine µg/L	<0.01	<0.01
Dichloromethane	<1	<1
Simazine µg/L	<0.01	<0.01
Toluene µg/L	<0.28	<0.28
Tributyltin µg/L	not required	not required
Xylenes µg/L	<1	<1
Arsenic µg/L	<0.96	<0.96
Chromium ug/L	<20	<20
Copper ug/L	<20	<20
Cyanide µg/L	<5	<5
Fluoride µg/L	<100	<100
Lead ug/L	<20	<20
Nickel ug/L	<20	<20
Zinc ug/L	<20	<20
Boron ug/L	<20	<20
Cadmium ug/L	<20	<20
Mercury µg/L	<0.2	<0.2
Selenium µg/L	<0.74	<0.74
Barium ug/L	20.845	20.845

Attachment E4 MOGEELY Downstream Table E4

Sample Date	07/05/2009	
Sample	River	Average
Sample Code	GT645	
Flow M ³ /Day	*	
pH	8.1	8.1
Temperature °C	*	*
Cond 20°C	298	298
SS mg/L	<2.5	<2.5
NH ₃ mg/L	<0.1	<0.1
BOD mg/L	2	2
COD mg/L	<21	<21
TN mg/L	5.74	5.74
Nitrite mg/L	<0.10	<0.10
Nitrate mg/L	5.16	5.16
TP mg/L	<0.05	<0.05
O-PO ₄ -P mg/L	<0.05	<0.05
SO ₄ mg/L	<30	<30
Phenols µg/L	<0.10	<0.10
Atrazine µg/L	<0.01	<0.01
Dichloromethane	<1	<1
Simazine µg/L	<0.01	<0.01
Toluene µg/L	<0.28	<0.28
Tributyltin µg/L	not required	not required
Xylenes µg/L	<1	<1
Arsenic µg/L	<0.96	<0.96
Chromium ug/L	<20	<20
Copper ug/L	<20	<20
Cyanide µg/L	<5	<5
Fluoride µg/L	<100	<100
Lead ug/L	<20	<20
Nickel ug/L	<20	<20
Zinc ug/L	37.64	37.64
Boron ug/L	<20	<20
Cadmium ug/L	<20	<20
Mercury µg/L	<0.2	<0.2
Selenium µg/L	1.5	1.5
Barium ug/L	78.14	78.14

Dixon • Brosnan
environmental consultants

project title

Womanagh Catchment Assessment

client

Cork County Council

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David Clarke

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1

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Carl Dixon

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DixonBrosnan Environmental Consultants
Dun Eoin, Ballinrea Road, Carrigaline, Co. Cork, Ireland.
Tel: +353 (0)21 4377947 Fax: +353 (0)21 4377947
Carl Dixon: 086 8511437 carl@dixonbrosnan.com
Damian Brosnan: 086 8131195 damian@dixonbrosnan.com
www.dixonbrosnan.com

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CONTENTS

1. INTRODUCTION	4
<i>PART 1: EXISTING ENVIRONMENT</i>	5
2. CATCHMENT OVERVIEW	5
3. ABSTRACTIONS & DISCHARGES	9
4. FLOW DATA	14
5. HABITAT DESIGNATIONS & FISHERIES	16
6. WATER QUALITY MANAGEMENT PLANS	17
7. WATER QUALITY DATA: CORK COUNTY COUNCIL	18
8. WATER QUALITY DATA: EPA	24
9. SITE SURVEYS	26
10. NOISE & ODOUR	30
11. INTERPRETATION: EXISTING ENVIRONMENT	31
<i>PART 2: LEGISLATION & STANDARDS</i>	34
12. SURFACE WATER DIRECTIVE	34
13. BATHING WATER DIRECTIVE	34
14. FRESHWATER FISH DIRECTIVE & SALMONID REGULATIONS	35
15. SHELLFISH DIRECTIVE	36
16. URBAN WASTE WATER TREATMENT DIRECTIVE	37
17. PHOSPHORUS REGULATIONS	38
18. NITRATES DIRECTIVE	40
19. ROYAL COMMISSION STANDARDS	41
20. WATER FRAMEWORK DIRECTIVE	42
21. NOISE & ODOUR	42
22. INTERPRETATION: LEGISLATION & STANDARDS	43

<i>PART 3: DISCHARGES & RECOMMENDATIONS</i>	45
23. IMPACT ASSESSMENT	45
24. PROPOSED DEVELOPMENTS	45
25. DISCHARGE OPTIONS	47
26. DILUTION CAPACITIES	48
27. WASTE ASSIMILATIVE CAPACITY & BOD	49
28. SUSPENDED SOLIDS	51
29. NITROGEN	52
30. PHOSPHORUS	54
31. PATHOGENS	56
32. WWTP SUMMARIES	56
33. LOADINGS IN WOMANAGH CATCHMENT	61
34. OTHER CONSIDERATIONS	64
35. REFERENCES	66
APPENDICES	67

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1. INTRODUCTION

1.1 DixonBrosnan Environmental Consultants were commissioned by Cork County Council to carry out an environmental assessment of the River Womanagh catchment in East Cork. Cork County Council proposes to provide appropriate treatment to existing wastewater discharges in the catchment, and to make provision for additional discharges arising at five settlements: Mogeely, Castlemartyr, Ladysbridge, Killeagh and Ballymacoda.

1.2 The tender brief issued by Cork County Council specifies that the assimilative properties of the various receiving waters in the catchment, and their capacity to receive treated effluent from the various settlements, are assessed. The identification of other point discharges and assessment of their impacts is also specified.

1.3 This report does not purport to be an Environmental Impact Statement as described in the European Communities (Environmental Impact Assessment) Regulations, 1989 (SI No. 349 of 1989). However the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Statements* (2002) and *Advice notes on current practice in the preparation of Environmental Impact Statements* (2003) were consulted during the preparation of this report.

1.4 The report is presented in three parts as follows:

Part 1: Existing environment

Part 2: Legislation & standards

Part 3: Discharges & recommendations.

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2. CATCHMENT OVERVIEW

2.1 Hydrology

2.1.1 The Womanagh catchment is the largest in East Cork, draining an area of approximately 165 km² between Middleton and Youghal. The catchment is bounded to the west by the Dungourney catchment, and to the east by the Tourig catchment. The terrain to the north of the catchment drains northwards to the River Bride, a tributary of the River Blackwater. The southern boundary of the catchment is separated from the coast by a ridgeline which is drained by many small rivers and streams discharging directly to the coast. The Womanagh catchment is indicated in figure 1.

2.1.2 The Womanagh River itself flows in an eastwards direction across the southern end of the catchment. The main channel rises in the southwestern corner of the catchment, in the townland of Innygraga, and flows east through Ladysbridge and onwards to Pillmore strand where it discharges to Youghal Bay. The Womanagh River is joined by several streams and rivers, three of which are significant. All three drain from the north.

2.1.3 The Kiltha River drains the northwest area of the Womanagh catchment. The river flows through a narrow valley separated from the adjacent Dungourney valley by less than 1 km in parts, and thus the Kiltha is located along the western margin of the catchment. Due to the narrow valley through which the Kiltha flows, the area drained is relatively small at 31 km² despite flowing for a distance of 17 km. The river drains the settlements of Mogeely and Castlemartyr before meeting the Womanagh main channel immediately upstream of Ladysbridge.

2.1.4 The largest tributary in the catchment is the Dissour River which drains the eastern parts of the catchment and much of the northern areas. The Dissour also flows through a narrow valley; it differs from the Kiltha however by the increased area drained in its upper reaches and by its confluence with several minor tributaries. Thus the total area drained is a significantly larger 42 km² in spite of a relatively short main channel length of 13 km. The only settlement on the Dissour River is Killeagh, 3 km upstream of its confluence with the Womanagh River. Reference is made in this report to the Lagile River, a small tributary of the Dissour.

2.1.5 The Dower River rises to the surface at Dower, 1 km upstream of its confluence with the Womanagh. The substantial flow in the river suggests that it drains a significant subcatchment, most likely located to the north between the Kiltha and Dissour subcatchments. Thus it is likely that the Dower River is continuous with an unnamed river which rises at Bawnadoune and flows southwards to Ballindinis where it disappears beneath the surface. For the purpose of this report it is assumed that the unnamed river becomes the Dower River, and the Dower title is applied to both sections.

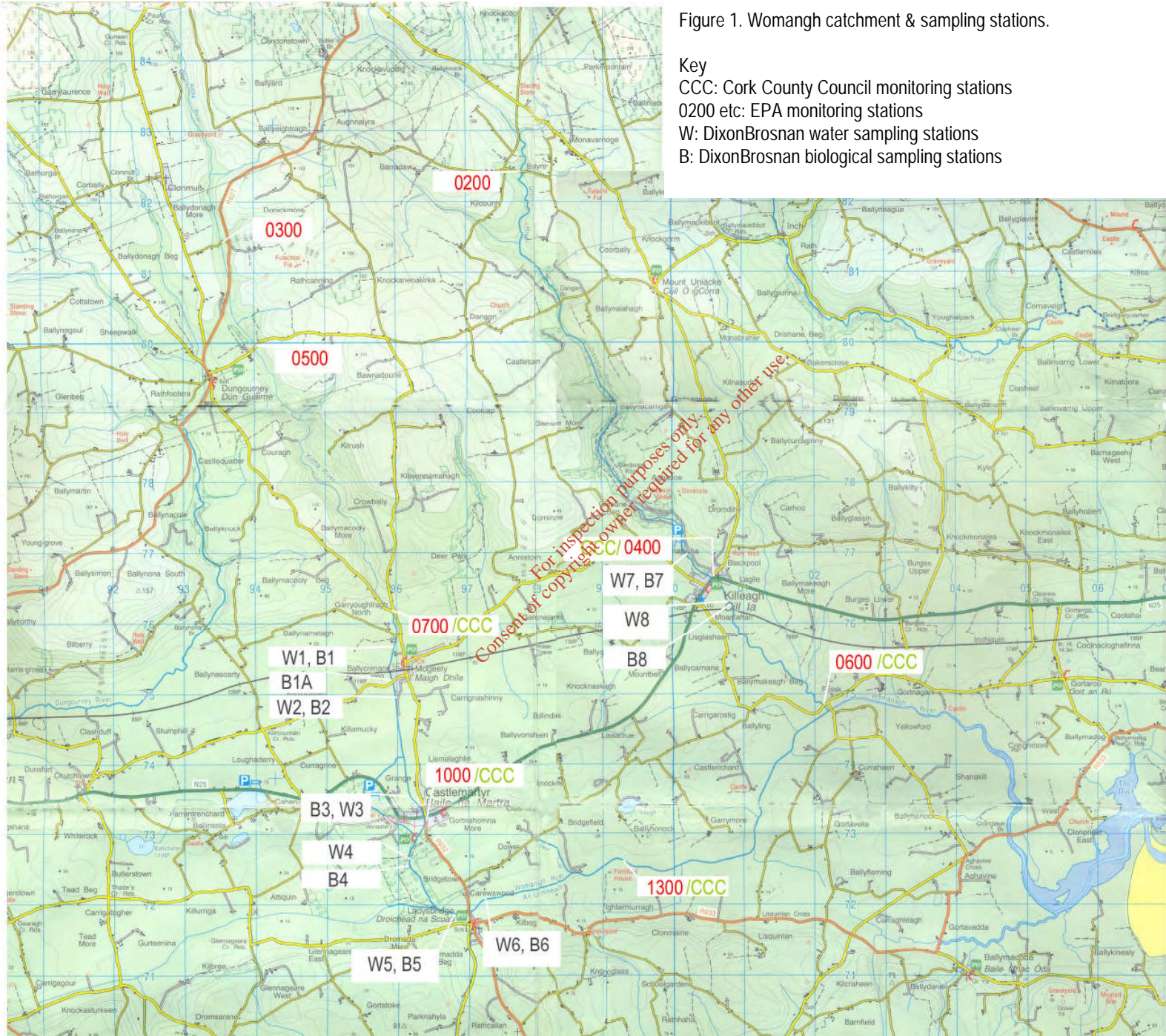


Figure 1. Womagh catchment & sampling stations.

- Key
- CCC: Cork County Council monitoring stations
 - 0200 etc: EPA monitoring stations
 - W: DixonBrosnan water sampling stations
 - B: DixonBrosnan biological sampling stations

0200

0300

0500

0700 / CCC

1000 / CCC

1300 / CCC

W1, B1

B1A

W2, B2

B3, W3

W4

B4

W5, B5

W6, B6

W7, B7

W8

B8

0600 / CCC

0400

2.1.6 There are no lakes within the Womanagh catchment. The largest standing body of water is Ballyhonock Lough, 3 km east of Castlemartyr and measuring approximately 7 ha in area. Ballyhonock Lough is not directly linked to the 1 km distant Womanagh River by any surface watercourses of significance. The well known Lough Aderra adjacent to the N25 between Middleton and Castlemartyr lies immediately outside of the Womanagh catchment.

2.1.7 The main channel of the Womanagh meets Youghal Bay at the southeast corner of the catchment. The river becomes tidal at Finisk Bridge, immediately downstream of the Womanagh-Dissour confluence and 8 km upstream of the bay. Like many rivers, the lower stretches of the Womanagh are meandering and characterised by a soft substrate due to silt deposition. The river becomes estuarine near the shoreline; a traditional estuary has not formed however due to the presence of a strand along the final kilometre. The strand, stretching north to Youghal, is an important recreational area. The tidal stretches of the Womanagh are joined by several streams draining a combined area of approximately 32 km². One of these flows through Ballymacoda village.

2.1.8 The hydrology of the Womanagh catchment is summarised in table 2.1.

Table 2.1 Womanagh catchment hydrology.

Subcatchment	Main channel length km	Area km ²
Kiltha River	17	31
Dissour River	13	42
Dower River	8	12
Womanagh River	22	80
	Total	165

2.2 Geology

2.2.1 The majority of the Womanagh Estuary lies within the Little Island formation which extends from Crookstown in the west to Youghal at the east end of the Cork syncline. The limestone of the Cork syncline to the north of Ballymacoda is considered a major aquifer and permeability is generally high. Karst features are typical of such formations and are reflected in large springs such as the Dower water supply near Castlemartyr.

2.2.2 The upper sections of the Dissour and Kiltha catchments are located within the Ballytrasna formation which consists of mudstone with some sandstone. Thus the karst features which are prominent in the lower catchment are absent from the upper sections of both rivers.

2.3 Landform & use

2.3.1 The upper reaches of the Womanagh tributaries in the northern half of the catchment are characterised by narrow valleys and low hills. The highest elevations in the catchment are seen here with several locations above 200 m OD. These hills generally form the watershed at the northern edges of the catchment. The topography falls gradually southwards and there are no points above 100 m OD south of Killeagh, the most central settlement in the catchment.

2.3.2 The lower half of the catchment consists of the relatively flat Womanagh plain. The topography follows the typical east-west pattern seen across much of County Cork, with the northern and southern boundaries of the plain delineated by low hills. While the northern boundary gradually rises to form the uplands noted in 2.3.1, the southern boundary is more clearly defined by a low ridgeline along the entire southern boundary and rising to 100 m OD. In the southern half of the catchment the eastern and western margins are less apparent. This is particularly the case to the southeast where the lowlands extend eastwards towards marsh areas at Ballyvergan.

2.3.3 Land use within the catchment closely reflects the topography. Upland areas in the north of the catchment are characterised by poorer quality land, and tracts of coniferous forestry have been planted in parts. Such commercial plantations are quite apparent in the northern extremities where the rising terrain is not readily farmed. Difficulties with poor quality soils are compounded by steep hillsides, particularly in the narrow valleys of the Kiltla and Dissour Rivers and their tributary streams. In such areas stands of deciduous trees predominate, and in this regard the upper catchment is similar to the adjacent Dungourney catchment.

2.3.4 The flat Womanagh plain has been farmed for centuries and historically a number of large estates were developed in the more fertile areas. The plain is now intensively farmed with pasture and tillage predominating. Associated with such practices is the application of artificial fertiliser, the installation of subsurface drainage networks, and the creation of larger fields by the removal of hedgerows. There are few fallow or unworkable zones in the southern half of the catchment, and consequently there is limited planting of coniferous forestry. However, the land assumes marsh characteristics near the southeast corner where the catchment drains to Youghal Bay. In the long term, any increases in sea level attributable to the global warming phenomenon will result in increased risk of flooding here unless suitable prevention measures are taken.

2.4 Settlements

2.4.1 Despite the relatively large surface area of the catchment and its proximity to the two largest towns in East Cork (Midleton and Youghal), there are few settlements located in the Womanagh catchment. This is particularly the case in the northern half of the catchment where the undulating topography and narrow valleys has limited development. The only agglomeration found in these uplands is the small village of Mount Uniacke.

2.4.2 The lowlands of the lower catchment have permitted greater development of villages, and all five settlements of significance within the catchment are located here. The largest of these are Castlemartyr and Killeagh, both of which are situated on the N25 national route. While neither village is deemed large enough to warrant specific mention in the main body of Cork County Council's Development Plan 2003, both villages are currently undergoing expansion and are likely to see continued development in the future. The populations of Castlemartyr and Killeagh are currently estimated at 1500 and 850 pe respectively.

2.4.3 The village of Ladysbridge lies 1.5 km south of Castlemartyr on regional route R632. This village is also undergoing some expansion due to its proximity to Cork City, and a number of residential developments have been constructed. The population here is estimated at 500 pe. The similarly sized village of Ballymacoda is located 8 km east of Ladysbridge. While Ballymacoda is not a commuter village in the conventional sense, the village is seeing some expansion at present due to its attractive coastal location.

2.4.4 Two kilometres north of Castlemartyr is the small village of Mogeely with an estimated population of 100 pe. One of the largest industrial discharges in the catchment is located here, and thus the village is of greater significance in the catchment than its size might suggest. The village's proximity to Cork City and Midleton may also encourage local residential development in the future.

2.4.5 Of the five settlements noted, only Ladysbridge is located directly on the main channel of the Womanagh River. Mogeely and Castlemartyr are located on the Kiltha River while Killeagh straddles the Dissour River. The villages of Mogeely, Castlemartyr and Ladysbridge form an extended development corridor 4 km in length, separated into three agglomerations by agricultural land.

2.4.6 Ballymacoda village is located on a small unnamed stream which, 400 m downstream of the village, discharges to a tributary of the Womanagh River. The tributary, hereafter referred to as the Ballymacoda River, drains an area of 7.5 km² at the southeast corner of the Womanagh catchment. The Ballymacoda River meets the Womanagh in the tidal zone 2 km upstream of Pillmore strand.

3. ABSTRACTIONS & DISCHARGES

3.1 Abstractions

3.1.1 The underlying geology of much of the Womanagh catchment is such that good quality groundwater is readily available. Consequently public water provided by the local authority to Mogeely, Castlemartyr, Killeagh, Ladysbridge and Ballymacoda is supplied from groundwater sources. Excluding the Dower abstraction (see 3.1.4) there are no direct public supply abstractions from surface waters in the catchment. As wastewater discharges

from the settlements are directed to surface waters, the settlements may be considered net contributors to the surface water catchment.

3.1.2 Water provided at Killeagh and Ballymacoda is abstracted from local borewells. The volume of water taken is estimated at 160 m³/day and 110 m³/day respectively. Potable water supplied to Mogeely, Castlemartyr and Ladysbridge is abstracted from an infiltration gallery located adjacent to the Kiltia River at Mogeely. Discussions with Cork County Council technical staff indicate that the gallery is most likely fed by springs rather than river water. This supply, with an estimated demand of 600 m³/day, is supplemented by several scattered borewells near Castlemartyr and Ladysbridge.

3.1.3 Dairygold operate a milk processing facility at Mogeely. While much of the potable water used onsite is taken from the public supply, supplementary water is also taken from an onsite well.

3.1.4 Potable water supplied to the villages of Whitegate, Aghada, Ballincurragh, Ballycotton and their environs, outside of the Womanagh catchment, is drawn from the Dower River where it rises to the surface at Dower. With a daily demand of 5200 m³, this supply represents the only significant surface water abstraction in the catchment. It is likely that the abstraction point on the Dower River also draws from springs feeding the river north of its re-emergence at Dower.

3.1.5 During the preparation of this report an inspection of the catchment was undertaken with a view to identifying additional surface water abstractions. Abstractions within the catchment are generally taken from groundwater. A possible surface water abstraction was noted in the Dissour River upstream of the main bridge in Killeagh. The volume of water abstracted at this point is not known but is unlikely to be significant.

3.2 Discharges

3.2.1 Cork County Council operates a sewage treatment scheme in the village of Mogeely. The scheme directs wastewater to a wastewater treatment plant (WWTP) which provides secondary treatment. The treated effluent is discharged to the Kiltia River on the western side of the village. The estimated load currently treated by the plant is 100 pe although the capacity of the plant is understood to be 200 pe. A number of properties in the village discharge to individual septic tanks.

3.2.2 Wastewater arising at Castlemartyr is directed to a modern activated sludge WWTP. The plant also treats effluent arising from a local college and manufacturing facility. The plant provides secondary treatment, without nutrient removal, prior to discharge to the Kiltia River 300 m downstream of the village. While the design capacity of the plant is 2000 pe, the current load discharging to same is 1500 pe. The plant is operated by Response Engineering Ltd. on behalf of Cork County Council. A review of monitoring data for the period January-October 2005 (table 3.1) indicates fluctuations in the treatment performance, with a general increase in concentrations of BOD and suspended solids in the treated effluent being apparent during the course of the year. Concentrations

exceeded recommended levels on more than one occasion. Elevated concentrations of total phosphorus were noted during July, August and September 2005.

Table 3.1 Monitoring data Castlemartyr WWTP 2005.

	January	February	March	April	May	June	July	August	September	October
pH In	7.43	7.61	7.33	7.23	7.23	7.66	7.01	7.16	7.01	6.80
pH Out	7.08	7.15	7.05	7.11	7.08	6.99	6.62	6.89	6.86	6.89
COD In mg/l	592.40	843.00	905.00	718.00	694.00	594.00	651.50	686.00	921.00	916.20
COD Out mg/l	18.20	33.50	44.50	46.75	59.25	56.00	50.00	38.60	50.50	49.00
BOD In mg/l	291.40	402.00	432.75	352.75	330.00	282.20	310.25	325.00	434.50	435.40
BOD Out mg/l	8.40	16.25	19.75	19.50	25.50	20.20	20.00	17.00	21.50	22.40
SS In mg/l	68.80	328.00	422.50	721.50	328.40	137.40	145.00	176.54	1541.00	516.00
SS Out mg/l	6.20	28.50	21.50	20.00	37.20	27.60	14.25	18.12	43.00	28.50
TP In mg/l	11.40						11.70	14.10	11.10	17.00
TP Out mg/l	2.05						4.07	10.30	8.60	2.70

Source: Response Engineering Ltd.

3.2.3 A septic tank currently provides primary treatment of wastewater arising in the village of Ladysbridge. The tank effluent is discharged to the Womanagh River immediately north of the village at the R632 road bridge. The septic tank is currently overloaded with the population load estimated at 500 pe. An assessment of this discharge undertaken in 2001 by DixonBrosnan indicated a slight deterioration in river water quality downstream of the discharge.

3.2.4 Response Engineering Ltd. also operate a WWTP at Killeagh on behalf of Cork County Council. The plant provides secondary treatment, without nutrient removal, for an estimated population load of 850 pe. The plant is nearing its design capacity of 1000 pe. The treated effluent is discharged to the Dissour River at Moanlahan, several hundred metres downstream of the village. Monitoring data presented in table 3.2 for the period January-October 2005 indicate that this plant is operating satisfactorily, although total phosphorus concentrations in the discharge were elevated in July and August 2005.

3.2.5 At Ballymacoda wastewater arising from an estimated population load of 500 pe is directed to a septic tank located to the north of the village. The tank provides primary settlement prior to discharge to groundwater via a percolation area. A 2002 assessment of this discharge by DixonBrosnan indicated however that the local conditions are not ideally suited to percolation, and some evidence of pollution of an adjacent stream was noted. This stream meets the Ballymacoda River 400 m northeast of the village.

3.2.6 Cork County Council's existing WWTPs are indicated in figure 2. Apart from these, there are no other municipal wastewater discharges in the catchment. The minor agglomeration of Mount Uniacke is served by individual septic tanks.

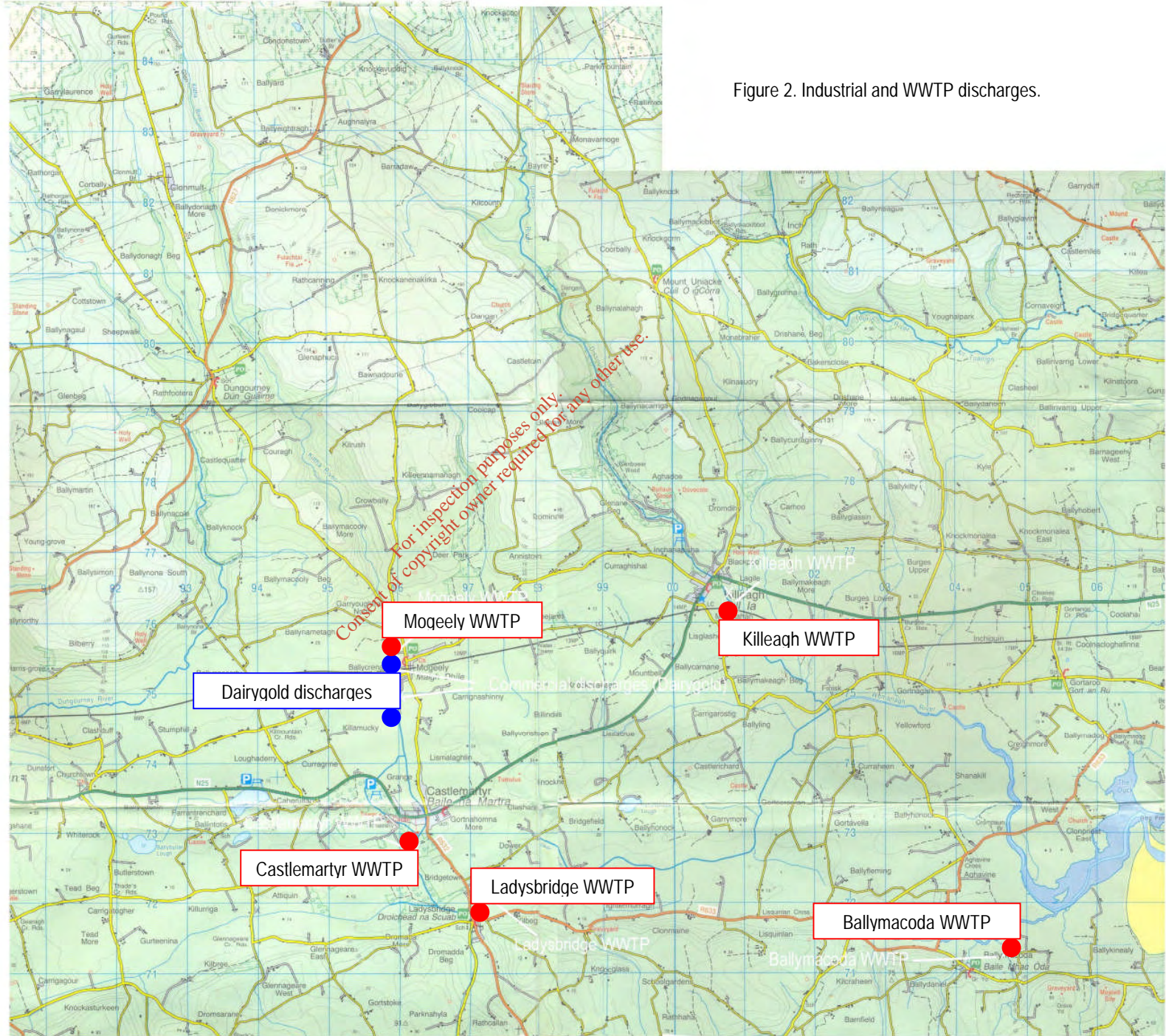


Figure 2. Industrial and WWTP discharges.

Table 3.2 Monitoring data Killeagh WWTP 2005.

	January	February	March	April	May	June	July	August	September	October
pH In	7.14	7.37	6.97	7.25	7.26	7.30	7.14	7.01	7.28	7.14
pH Out	7.34	7.57	7.30	7.37	7.48	7.15	6.97	7.12	7.31	7.17
COD In mg/l	385.40	405.00	572.50	319.75	291.50	329.80	153.25	375.20	262.25	335.60
COD Out mg/l	11.40	32	32.5	28.25	39.75	49.00	43.25	44.80	32.50	31.40
BOD In mg/l	167.20	193.00	272.75	151.75	138.50	155.52	72.86	178.60	124.25	160.00
BOD Out mg/l	5.60	15	15.75	12	17.75	20.80	20.50	17.40	13.83	14.80
SS In mg/l	67.40	176	268.75	140.5	123.42	39.92	15.80	52.62	20.75	32.33
SS Out mg/l	4.48	19	12.15	14.75	19.55	15.84	11.75	12.88	7.81	2.86
TP In mg/l	2.55						4.8	29.00	3.50	3.40
TP Out mg/l	0.20						3.40	6.20	1.96	1.40

Source: Response Engineering Ltd.

3.2.7 The capacity of a watercourse to assimilate a treated wastewater discharge at a location is a function of dilution which is dependent on the catchment area draining through that particular location. Accordingly the areas of each subcatchment upstream of the WWTP discharges at Mogeely, Castlemartyr, Ladysbridge, Killeagh and Ballymacoda are of some relevance. The area of each subcatchment is presented in table 4.1.

3.2.8 Cork County Council's Environment Department lists three regulated commercial wastewater discharges in the Womanagh catchment. The smallest of these relates to a service station and restaurant at Burges, 3 km east of Killeagh. Wastewater discharge licence WP(W)2/87 permits the discharge of surface waters and kitchen wastewater to a small stream which ultimately meets the main channel of the Womanagh River. This premises is currently closed. An intensive piggery installation at Annistown, 2.5 km west of Killeagh is regulated by the EPA and is currently undergoing changes in its license as a result of the transition from IPC to IPPC licensing.

3.2.9 The most significant commercial discharge arises from a creamery at Mogeely (discharge licence WP(W) 4/03r). The facility, generally operative between March and September, discharges to the Kilttha River via a modern WWTP which incorporates a sand filtration system and nutrient removal. Licence WP(W) 4/03r specifies the following limits with respect to the discharge: volume 566 m³/day, COD 30 mg/l, total phosphorus 1.2 mg/l P, detergents 5 mg/l and mineral oils 5 mg/l. Previously this facility operated under licence WP(W) 4/90 with discharge limits of: volume 500 m³/day, BOD 15 mg/l, suspended solids 15 mg/l, orthophosphate 1 mg/l P and total phosphorus 3 mg/l P. Data provided by Cork County Council suggests that the discharge volume may be 650 m³/day. For the purposes of this report, it is assumed that the current phosphorus limit of 1.2 mg/l P is being met, despite a measured average total phosphorus concentration of 1.64 mg/l P over two samples taken in 2005 and 2006. It is also conservatively assumed that 50% of the phosphorus discharged to the receiving waters is available as orthophosphate ie. 0.6 mg/l P.

3.2.10 Orthophosphate is generally considered to be the nutrient of greatest concern in freshwater systems. The orthophosphate load discharged to the Kilttha River from the Mogeely creamery facility is calculated at 0.39 kg/day

P, totalling approximately 83 kg P over the March-September operations period. This loading has been determined on the assumptions outlined in 3.2.9 (650 m³/day containing 0.6 mg/l P).

3.2.11 During the preparation of this report, the Womanagh catchment was inspected for surface water discharges other than those noted above. Information on discharges observed is presented in appendix 1. Appendix 1 also lists all licensed discharges. A number of housing developments are under construction or are proposed at several villages in the catchment. It is expected that future developments will discharge to their respective local public sewers and will therefore be treated by the local authority WWTPs.

4. FLOW DATA

4.1 The total surface area of the Womanagh catchment is 165 km². Surface areas drained by the four chief watercourses in the catchment have been presented in table 2.1. Subcatchment areas upstream of each of the five settlements under consideration in this report are presented in 4.1. The area discharging through Ballymacoda is considered insufficient and a new discharge location is required here.

Table 4.1 Subcatchment areas upstream of WWTPs.

LOCATION	SUBCATCHMENT AREA km ²
Mogeely WWTP	23
Castlemartyr WWTP	30
Ladysbridge WWTP	45
Killeagh WWTP	31
Ballymacoda WWTP	1.3

4.2 The Environmental Protection Agency document *Hydrological data: A listing of water level recorders and summary statistics at selected gauging stations* (1997) notes the existence of five hydrometric stations on the Womanagh catchment. The flows recorded at these stations are presented in table 4.2. The 95th percentile flow per area recorded at Mogeely is higher than at Castlemartyr, despite the latter's downstream location. The EPA notes that this anomaly is due to the presence of an ornamental pond at Castlemartyr which provides additional storage and impacts slightly on flow readings.

4.3 The EPA Hydrometric Office notes that the correlation between flows and levels are unreliable and that the 95th percentile flows quoted in table 4.2 are based on discrete measured readings rather than continuously logged level data. The only automatic recorder in the catchment, located at Castlemartyr, was removed a decade ago. Consequently the data presented in table 4.2 may not be entirely accurate. Nonetheless, it is necessary to rely on

these data in the absence of other figures. It is noted that the 95th percentile flow data presented are not dissimilar to those reported for other rivers in County Cork. For the purposes of this report the 95th percentile flow data as determined from flow monitoring stations will be applied. The unit flow data for Mogeely and Castlemartyr are detailed in table 4.3.

Table 4.2 Flow data at Womanagh hydrometric stations.

Station	River	NGR	Catchment area km ²	DWF* m ³ /s	95% flow m ³ /s	Unit 95% flow m ³ /s/km ²
Mogeely	Kiltha	W960757	21	0.008	0.030	0.00143
Castlemartyr	Kiltha	W962728	27	0.0085	0.033	0.00121
Killeagh	Dissour	X008759	33	0.020	0.040	0.00122
Lagile	Dissour tributary	X013764	8	0.003	0.015	0.00192

Source: EPA Hydrometric Office

*DWF: dry weather flow

Table 4.3 Flows at Mogeely and Castlemartyr.

Location	River	Catchment area upstream of WWTP km ²	Unit 95% flow m ³ /s/km ²	95% flow m ³ /s
Mogeely	Kiltha	23	0.00143	0.0329
Castlemartyr	Kiltha	30	0.00121	0.0363

4.4 Two flow monitoring stations are located in proximity to Killeagh: on the Dissour River and on its tributary the Lagile River. Due to variations in the flow data recorded (table 4.4), the mean of their unit 95th percentile flows is considered more representative of the actual flow at Killeagh.

Table 4.4 Flow at Killeagh.

Location	River	Catchment area upstream of WWTP km ²	Unit 95% flow m ³ /s/km ²	95% flow m ³ /s
Killeagh	Dissour	-	0.00122	-
Killeagh	Lagile	-	0.00192	-
Combined	Dissour	31	0.00157	0.0487

4.5 There is no monitoring station at Ladysbridge and thus flows must be estimated here. During the preparation of this report, an assessment of flows was made by reference to similar catchments and by recording river flows using a flow logger. Following the assessment (summarised in appendix 2) it was decided to apply long term EPA data notwithstanding the possible high error margin contained therein. With respect to Ladysbridge, the unit 95th percentile flow derived from the flow monitoring station at Castlemartyr is applied (table 4.5).

Table 4.5 Flow at Ladysbridge.

Location	River	Catchment area upstream of WWTP km ²	Unit 95% flow m ³ /s/km ²	95% flow m ³ /s
Ladysbridge	Womanagh	45	0.00121	0.0545

4.6 The source of the Dower River is a natural spring which is one of the largest in Ireland. The spring rises to the surface approximately 2 km southeast of Castlemartyr where it emerges from a limestone cave. Water abstracted is supplied to domestic consumers in Ballinacurra, Ballycotton, Churchtown, Garryvoe, Shanagarry, Gyleen, Trabolgan, Saleen, Upper Aghada, and Whitegate. Whitegate oil refinery is also supplied. Normal abstraction averages 4550 m³/day. A report entitled *Dower springs: Groundwater source protection zones* by Wright and Gately (2002) estimates the areal extent of the Dower catchment at 19.5 km² and notes that its western boundary lies within 200 m of the Kiltha River. The northern boundary of the catchment is defined by the topography of Knockanenakirka hill. Two swallow holes are located at Ballyvorisheen and Carrignashinny. The same report also notes that a weir and automatic recorder located downstream of the spring are affected by weed growth. The report concludes that, while the abstraction exceeds the natural flow in very dry weather, the spring behaves like a large well creating a wide shallow cone of depression. It is thus possible that the presence of the Dower spring causes reduced flows at Castlemartyr and in the main channel of the Womanagh. This effect is difficult to measure.

4.7 All watercourses in the vicinity of Ballymacoda are subject to tidal influence and sluice control. It follows that freshwater flow data are of limited value in calculating assimilative capacity. During a previous assessment at this location (DixonBrosnan report 02001) it was noted that accurate monitoring of the local flow regime was not possible. The 95th percentile flow of the Ballymacoda River was estimated at 650m³/day. The 95th percentile flow in the Womanagh River, approximately 900 m from the WWTP site, was estimated at 12000 m³/day.

5. HABITAT DESIGNATIONS & FISHERIES

5.1 The Ballymacoda coastline at Clonpriest and Pillmore is classified as a Special Area of Conservation (SAC) under Council Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora (site code 000077). The SAC is flanked on either side by two Natural Heritage Areas (NHAs), namely Ballyvergan Marsh (site code 000078) and a composite coastal site at Ballycotton, Ballymona and Shanagarry (site code 000076). Site synopses for these locations are presented in appendix 3.

5.2 The Ballymacoda SAC stretches northeast from the Ballymacoda River to within 6 km of Youghal. The SAC includes the Womanagh Estuary and foreshore. It also includes a section of the Ballymacoda River which itself is

not of particular ecological value. Important habitats include salicornia mud, Atlantic salt meadows and large shallow inlets. The Womanagh Estuary has extensive mudflats, marshy fields and salt marsh. The lower estuary is also designated as a Special Protection Area (SPA) under Council Directive 79/409/EEC on the conservation of wild birds (superseded by Directive 92/43/EEC) due to the large number of birds which feed here. Important species include golden plover and bar-tailed godwit, with nationally important numbers of teal, ringed plover, grey plover, lapwing, dunlin, curlew, redshank, black-tailed godwit and turnstone. It follows that the Womanagh Estuary is of considerable ecological value and its protection and conservation is of primary importance. The site synopsis suggests that the main threat to the area is from water pollution arising primarily from the spreading of agricultural slurry.

5.3 The Natural Habitats Regulations 1997 (SI No. 94 of 1997) transposed the Habitats Directive into Irish law. The Regulations specify a number of legal provisions for SACs including a requirement for the assessment of developments which may have a significant impact on a SAC.

5.4 Both the Womanagh and Dissour Rivers are important fisheries for sea trout (*Salmo trutta*) and brown trout (*S. trutta*). Neither river has a large run of salmon (*S. salar*). Sea bass (*Dicentrarchus labrax*) have been caught in the Womanagh Estuary. Large shoals of grey mullet (*Chelon labrosus*) move upstream at high tide, while flatfish such as flounder (*Platichthys flesus*) also occur in the estuary. It has been suggested that smelt (*Osmerus eperlanus*) and/or shad (*Alosa* sp.) may be present in the catchment although no data are available. Both species are found in estuaries or shallow coastal waters and spawn in the lower reaches of rivers. The distribution status of both species in Ireland is uncertain, and both are included in the Irish Red Data Book (Whilde, 1993). During the preparation of this report brook lamprey (*Lampetra planeri*) was detected at two biological sampling sites upstream of Mogeely and upstream of Castlemartyr (sites S1 and S3). This non-migratory species is listed under annex II of the Habitats Directive and included in the Irish Red Data Book. The brook lamprey lives in sandy and gravelly rivers, particularly in limestone areas. The Irish Red Data Book notes that most records are concentrated in the north and northwest with one positive record in Cork.

5.5 The Ballymacoda River is unlikely to have serious potential as a fishery due to the physical barrier to upstream movement presented by the sluice. Some species such as flounder and mullet may move through the sluice gates but will generally be small and of no angling value. Spawning gravels are absent from this part of the Womanagh system, and the presence of large numbers of brown trout is considered very unlikely.

6. WATER QUALITY MANAGEMENT PLANS

6.1 The Local Government (Water Pollution) Act, 1977, provides for one or more local authorities to take co-ordinated action on a river catchment basis by the preparation and implementation of river catchment

management plans. Cork County Council has not previously adopted any plan with respect to the Womanagh catchment.

6.2 The above management function has now been superseded by EU Directive 2000/60/EC establishing a framework for Community action in the field of water policy. Under this Water Framework Directive, local authorities are obliged to prepare river basin management plans. The Womanagh catchment lies within the southwest river basin district. Cork County Council, the designated authority responsible for this district, have adopted an advisory council which will manage the preparation of the river basin management plan. It is likely that the plan will take several years to prepare and implement. In the meantime there are no plans in force with respect to the Womanagh catchment.

6.3 In the absence of any formal management plans, the Phosphorus Regulations and their implementation reports constitute the chief water quality programme in place. The most recent report was prepared in 2004 and the relevant pages of that report are included in appendix 4. The report notes that sites 1000 (Castlemartyr) and 1300 (south of Ballyhonock Lough) have been identified as sites where there may be difficulties in achieving the standards specified by the Phosphorus Regulations by 2007. It also notes that low Q values at these locations are due to agricultural, industrial and urban wastewater discharges and that these sites are subject to limestone spring effects.

7. WATER QUALITY DATA: CORK COUNTY COUNCIL

7.1 Monitoring data are available for the period 2002-2005 with respect to monitoring locations at Castlemartyr Bridge, south of Ballyhonock Lake, Killeagh Bridge and the Dissour upstream of its confluence with the Womanagh. Results for the period 2004-2005 are also available with respect to Mogeely. Available results are presented for these sites in tables 7.1-7.5. MRP refers to molybdate reactive phosphorus, chiefly orthophosphate. The Freshwater Fish Directive, Salmonid Regulations and Phosphorus Regulations, to which references are made below, are summarised in part 2 of this report.

7.2 Ammonium levels recorded north of Mogeely were satisfactory over the monitoring period, being generally lower than the maximum allowable concentration of 0.82 mg/l N specified in the Freshwater Fish Directive for total ammonium. The recorded levels were also generally lower than the 1 mg/l (for 95% of samples) specified in the Salmonid Regulations. One exception was noted: a concentration of 0.867 mg/l N was recorded in April 2004. Nitrate concentrations were satisfactory. While neither Directive nor Regulations specify mandatory nitrite limits, levels exceeded the 0.009 mg/l N guide value for cyprinid waters on five occasions.

Table 7.1 Kilttha River water quality at second bridge north of Mogeely 2004-2005.

Date	DO mg/l	DO %	NH ₄ mg/l N	NO ₃ mg/l N	NO ₂ mg/l N	MRP mg/l	Target P P Regs.
25.03.04	-	-	<0.020	6.18	0.006	0.024	Q4-5 to be maintained. 0.2 mg/l MRP to be achieved by 2007.
29.04.04	11.1	100	0.867	6.81	0.007	0.090	
27.05.04	11.2	105	<0.020	6.65	0.008	0.017	
29.06.04	10.1	97	0.021	5.40	0.018	0.046	
26.08.04	10.3	98	0.047	5.85	0.009	0.031	
20.10.04	11.5	100	0.023	5.96	0.005	0.027	
18.11.04	-	-	<0.020	6.38	0.013	0.024	
21.12.04	-	-	0.097	6.13	0.018	0.045	
26.01.05	-	-	0.035	6.72	0.017	0.030	
23.03.05	-	-	0.059	6.04	0.008	0.036	
27.04.05	11.4	102	<0.020	5.98	0.007	0.018	
23.06.05	10.4	103	<0.020	-	0.017	0.050	
21.07.05	9.8	103	0.021	-	0.008	0.052	
24.08.05	10.0	102	<0.020	5.81	<0.004	0.042	
Mean				6.16			
Median						0.034	

Source: Cork County Council Water Laboratory, Inniscarra

7.3 The median MRP value was calculated at 0.034 mg/l compared to a target value of 0.02 mg/l to be achieved by 2007. The mean nitrate value is higher than the 5.65 mg/l guideline nitrate value.

7.4 Table 7.2 below indicates that ammonium concentrations were satisfactory and below the Freshwater Fish Directive limit, apart from one sample taken in December 2004. Nitrate values were elevated at 6.20 mg/l N. The target MRP for this site to be achieved by 2007 is 0.03 mg/l; this value was greatly exceeded at this location where a median value of 0.069 mg/l was recorded.

7.5 While the trend with respect to ammonium continued downstream at Ballyhonock (ie. all samples except one were below the 0.82 mg/l N Freshwater Fish Directive limit), a deterioration in nitrate and nitrite levels is apparent, reflecting a gradual increase in eutrophication as the river flows towards the coast. Dissolved oxygen concentrations were also slightly depleted in late summer months. The median MRP value is higher than the 0.03 mg/l target specified in the Phosphorus Regulations.

7.6 Water quality parameters were more satisfactory in the Dissour River during the monitoring period. Concentrations of ammonium, nitrate, nitrite and orthophosphate were generally less than recorded in the Kilttha and Womanagh Rivers. However, the median MRP value was elevated above the 0.02 mg/l target.

7.7 Just as water quality in the Kiltha and Womanagh Rivers deteriorated downstream, a general reduction in quality is also apparent in the Dissour tributary between Killeagh and the Womanagh confluence. The median MRP concentration of 0.038 mg/l exceeded the 0.03 mg/l target. Nonetheless, water quality remained superior to that in the Womanagh main channel.

Table 7.2 Kiltha River water quality at Castlemartyr Bridge 2002-2005.

Date	DO mg/l	DO %	NH ₄ mg/l N	NO ₃ mg/l N	NO ₂ mg/l N	MRP mg/l	Target P P Regs.
30.01.02	-	-	0.078	6.37	0.018	0.041	Upgrade to Q4. 0.3 mg/l MRP to be achieved by 2007.
27.03.02	11.6		0.023	6.39	0.014	0.332	
24.04.02	10.8	-	0.023	5.89	0.020	0.051	
26.06.02	11.2	-	0.023	6.39	0.017	0.064	
28.08.02	9.3	-	0.039	6.12	0.029	0.375	
05.09.02	11.1	-	0.023	5.92	0.007	0.052	
24.10.02	8.5	-	0.023	6.25	0.005	0.031	
21.11.02	-	-	0.070	4.06	0.015	0.071	
20.08.03	11.4	118	<0.020	6.03	0.005	0.103	
25.03.04	-	-	<0.020	6.20	0.007	0.027	
29.04.04	11.3	103	<0.020	6.47	0.008	0.110	
27.05.04	10.2	99	<0.020	8.11	0.014	0.144	
29.06.04	9.6	93	0.038	6.42	0.032	0.135	
26.08.04	9.4	99	0.038	5.90	0.009	0.055	
20.10.04	11.6	100	0.026	6.02	0.005	0.036	
18.11.04	-	-	0.023	6.42	0.006	0.023	
21.12.04	-	-	0.093	6.10	0.023	0.048	
26.01.05	-	-	0.040	7.16	0.017	0.044	
23.03.05	-	-	0.062	6.17	0.011	0.117	
27.04.05	11.5	103	0.026	6.42	0.010	0.067	
23.06.05	9.4	96	0.040	-	0.026	0.268	
21.07.05	9.7	104	0.040	-	0.025	0.629	
24.08.05	9.6	99	0.020	6.93	0.009	0.294	
30.09.05	9.6	93	0.039	4.56	0.013	0.122	
Mean				6.20			
Median						0.069	

Source: Cork County Council Water Laboratory, Inniscarra

Table 7.3 Womanagh River water quality south of Ballyhonock Lake 2002-2005.

Date	DO mg/l	DO %	NH ₄ mg/l N	NO ₃ mg/l N	NO ₂ mg/l N	MRP mg/l	Target P P Regs.
27.02.02	-	-	0.023	6.41	0.014	0.031	Upgrade to Q4. 0.3 mg/l MRP to be achieved by 2007.
27.03.02	11.3	-	0.023	7.27	0.008	0.085	
24.04.02	10.5	-	0.031	6.77	0.016	0.040	
26.06.02	11.2	-	0.023	7.20	0.014	0.037	
28.08.02	8.0	-	0.031	6.64	0.028	0.140	
05.09.02	8.8	-	0.023	6.98	0.007	0.085	
24.10.02	8.5	-	0.023	6.48	0.008	0.038	
21.11.02	-	-	0.117	4.54	0.020	0.085	
20.08.03	-	-	0.031	7.59	0.009	0.029	
23.01.03	-	-	0.016	6.75	0.010	0.027	
27.02.03	-	-	0.016	7.43	0.004	0.017	
27.03.03	-	-	<0.020	6.90	0.007	0.022	
20.08.03	10.9	104	0.040	6.59	0.022	0.042	
25.03.04	-	-	<0.020	7.07	0.006	0.026	
29.04.04	12.3	113	0.026	7.52	0.011	0.054	
27.05.04	11.5	110	<0.020	8.20	0.007	0.036	
29.06.04	9.0	86	0.065	6.84	0.025	0.086	
28.07.04	8.5	83	0.020	7.22	0.037	0.082	
26.08.04	9.8	93	0.040	6.08	0.012	0.047	
20.10.04	10.5	94	0.039	6.76	0.011	0.044	
18.11.04	-	-	0.024	7.60	0.008	0.030	
21.12.04	-	-	0.069	6.93	0.021	0.047	
26.01.05	-	-	0.026	7.63	0.011	0.031	
23.03.05	-	-	0.064	6.71	0.010	0.058	
27.04.05	11.5	102	0.032	7.26	0.014	0.036	
23.06.05	9.8	95	0.040	-	0.039	0.050	
21.07.05	10.3	104	0.033	-	0.024	0.076	
24.08.05	9.2	96	0.044	7.15	0.023	0.172	
30.09.05	8.0	77	0.040	4.92	0.026	0.065	
Mean				6.86			
Median						0.044	

Source: Cork County Council Water Laboratory, Inniscarra

Table 7.4 Dissour River water quality at Killeagh Bridge 2002-2005.

Date	DO mg/l	DO %	NH ₄ mg/l N	NO ₃ mg/l N	NO ₂ mg/l N	MRP mg/l	Target P P Regs.
30.01.02	-	-	0.054	4.34	0.010	0.025	Q4-5 to be maintained. 0.2 mg/l MRP to be achieved by 2007.
27.02.02	-	-	0.023	4.06	0.011	0.023	
27.03.02	11.6	-	0.023	4.47	0.004	0.019	
24.04.02	10.9	-	0.023	4.09	0.006	0.024	
26.06.02	10.3	-	0.023	4.18	0.007	0.046	
28.08.02	9.9	-	0.023	4.29	0.007	0.074	
05.09.02	10.9	-	0.047	4.00	0.005	0.074	
24.10.02	9.4	-	0.023	4.15	0.005	0.032	
21.11.02	-	-	0.117	3.36	0.014	0.097	
19.12.03	-	-	0.023	4.97	0.004	0.026	
23.01.03	-	-	0.016	5.38	0.006	0.028	
27.02.03	-	-	<0.020	4.38	0.005	< 0.013	
27.03.03	-	-	<0.020	4.28	<0.004	0.019	
20.08.03	11.5	111	<0.020	3.94	<0.004	0.035	
25.03.04	-	-	<0.020	4.87	0.004	0.019	
29.04.04	11.2	102	<0.020	4.67	0.004	0.018	
27.05.04	11.5	103	<0.020	4.41	0.004	0.016	
29.06.04	10.0	95	0.029	4.10	0.007	0.049	
28.07.04	14.3	135	<0.020	4.14	0.005	0.036	
26.08.04	10.5	101	<0.020	3.95	<0.004	0.027	
22.09.04	-	-	0.020	4.46	<0.004	0.025	
20.10.04	11.5	100	0.020	4.83	<0.004	0.023	
18.11.04	-	-	0.021	5.07	<0.004	0.020	
21.12.04	-	-	0.026	5.06	0.007	0.032	
26.01.05	-	-	<0.020	5.42	0.006	0.023	
23.03.05	-	-	0.035	4.63	0.005	0.027	
27.04.05	11.4	101	<0.020	5.06	0.007	0.020	
23.06.05	10.4	102	<0.020	-	0.009	0.028	
21.07.05	10.3	107	0.023	-	0.004	0.039	
24.08.05	10.3	103	<0.020	4.16	<0.004	0.037	
30.09.05	9.9	94	0.021	3.40	0.004	0.034	
Mean				4.42			
Median						0.027	

Source: Cork County Council Water Laboratory, Inniscarra

Table 7.5 Dissour River water quality upstream of Womanagh confluence 2002-2005.

Date	DO mg/l	DO %	NH ₄ mg/l N	NO ₃ mg/l N	NO ₂ mg/l N	MRP mg/l	Target P P Regs.
30.01.02	-	-	0.086	4.90	0.022	0.006	Upgrade to Q4. 0.3 mg/l MRP to be achieved by 2007.
27.02.02	-	-	0.023	4.36	0.017	0.036	
27.03.02	11.8	-	0.023	4.90	0.008	0.032	
24.04.02	10.9	-	0.023	4.34	0.011	0.032	
26.06.02	11.7	-	0.023	4.65	0.012	0.053	
28.08.02	8.2	-	0.023	5.76	0.023	0.108	
05.09.02	8.2	-	0.023	6.59	0.004	0.045	
24.10.02	10.0	-	0.023	4.56	0.007	0.033	
21.11.02	-	-	0.140	3.45	0.020	0.100	
23.01.03	-	-	<0.016	4.81	0.003	0.020	
27.02.03	-	-	<0.016	4.67	0.004	0.022	
27.03.03	-	-	<0.020	4.71	0.006	0.029	
20.08.03	11.5	111	<0.020	4.20	0.005	0.048	
25.03.04	-	-	0.035	5.41	0.009	0.036	
29.04.04	11.2	102	<0.020	5.13	0.007	0.042	
27.05.04	12.9	109	<0.020	4.60	0.009	0.035	
29.06.04	10.0	96	0.037	4.33	0.013	0.077	
28.07.04	8.6	87	<0.020	4.25	0.009	0.080	
26.08.04	10.3	98	0.026	4.32	0.006	0.036	
22.09.04	-	-	<0.020	4.81	0.005	0.037	
20.10.04	11.6	101	0.024	5.26	0.006	0.038	
18.11.04	-	-	0.033	5.38	0.012	0.034	
21.12.04	-	-	0.037	5.50	0.013	0.049	
26.01.05	-	-	0.040	5.89	0.013	0.032	
23.03.05	-	-	0.048	5.24	0.009	0.043	
27.04.05	11.1	99	<0.020	1.61	0.011	0.020	
23.06.05	10.4	103	0.023	-	0.019	0.057	
21.07.05	9.8	104	0.029	-	0.012	0.086	
24.08.05	10.2	102	<0.020	4.67	0.005	0.075	
30.09.05	9.9	95	0.026	3.59	0.011	0.055	
Mean				4.71			
Median						0.038	

Source: Cork County Council Water Laboratory, Inniscarra

8. WATER QUALITY DATA: EPA

8.1 The Environmental Protection Agency carries out a biological assessment of most river channels in the country on a regular basis. The assessments are used to derive Q values, indicators of the biological quality of the water. The biological health of a watercourse provides an indication of long term water quality. The EPA Q value scheme is summarised in table 8.1

Table 8.1 EPA biotic index scheme.

Q value	Water quality	Pollution	Condition
5	Good	Unpolluted	Satisfactory
4	Fair	Unpolluted	Satisfactory
3	Doubtful	Moderately polluted	Unsatisfactory
2	Poor	Seriously polluted	Unsatisfactory
1	Bad	Seriously polluted	Unsatisfactory

Source: EPA

8.2 The intermediate ratings Q1-2, Q2-3, Q3-4 and Q4-5 are used to denote transitional conditions, while ratings within parenthesis indicate borderline values. Great importance is attached to the EPA biotic indices, and consequently it is these data that are generally used to form the basis of water quality management plans for river catchments.

8.3 Hydrometric area no. 19, which includes the Womanagh system, was most recently surveyed in 2005. Survey results for the years 1989 to 2005 are listed in tables 8.2 and 8.3.

Table 8.2 EPA Q values for Dissour River 19/D/03.

Station	Location	1989	1994	1997	1999	2002	2005	Target P Regs.
0200	Br WSW of Ballyre	4-5	3	4	4	4	4	4
0400	Killeagh Br	4-5	4	4-5	3-4	3-4	4	4-5
0600	Br u/s Womanagh confl	4-5	4	3-4	4	4	4	4
<p>2002 assessment: No change. Satisfactory apart from middle reach where treated sewage enters river from right hand side immediately downstream of Killeagh Bridge (0400).</p> <p>2005 unpublished data: Site 0400 is currently noncompliant in respect of the target value under the Phosphorus Regulations.</p>								

Source: EPA

Table 8.3 EPA Q values for Womanagh River 19/W/01.

Station	Location	1989	1994	1997	1999	2002	2005	Target P Regs.
0300	Br WNW of Donickmore Ho	-	-	4	4	4	4	4
0500	Br NE of Dungourney	3	3	3-4	4	4	4	4
0700	Second Br N of Mogeely	4	4	4-5	4	4	4	4-5
1000	Br in Castlemartyr	3-4	4	3-4	3	3-4	3-4	4
1300	S of Ballyhonock Lake	4	4-5	3-4	3-4	3	3	4

2002 assessment: Known as the Kiltla River in upper reaches, it was satisfactory except in lower reaches (1000, 1300) where again suspected discharges from Mogeely (industrial) and Castlemartyr (sewage) were responsible respectively for the slight and moderate pollution recorded. The lower reaches had large colonies of two American alien plants, the water fern (*Azolla filiculoides*) and least duckweed (*Lemna minuta*); these floating species reflect highly eutrophic conditions.

2005 unpublished data: Sites 0700, 1000 and 1300 are currently noncompliant in respect of the target value under the Phosphorus Regulations

Source: EPA

8.4 Q values recorded on the Dissour show an overall reduction in water quality between 1989 and 2005. However the reduction has stabilised and 2005 values recorded were similar to those of 1999 and 2002, with a slight improvement at Killeagh Bridge. The EPA notes that the water quality in 2002 was satisfactory apart from Killeagh Bridge where sewage pollution was observed. Overall, Q values recorded in the Dissour were indicative of satisfactory water quality; however results need to be considered with respect to the target values under the Phosphorus Regulations.

8.5 A more consistent trend has been recorded by the EPA with respect to the four monitoring stations on the Kiltla tributary (0300, 0500, 0700 and 1000). Q values recorded over 1999 and 2005 did not change. The three upstream stations on the Kiltla River were satisfactory in 2005, and only Castlemartyr exhibited reduced water quality. The EPA noted in 2002 that deleterious discharges at two locations influenced water quality.

8.6 Water quality in 2005 at station 1300, the only station on the main channel of the Womanagh, was unsatisfactory with a Q3 recorded. While a specific source or reason for the reduced water quality was not noted by the EPA in their 2002 assessment, it was suggested that the river was experiencing eutrophic conditions.

8.7 Overall, the Womanagh system would appear to be suffering from some degree of eutrophication, and Q values recorded are not entirely compliant with the requirements of the 1998 Phosphorus Regulations. The EPA have noted three specific point sources of potentially polluting material (industrial at Mogeely, and municipal at Castlemartyr and Killeagh), and have linked reduced quality data to these discharges. It is apparent from the data however that falling Q values recorded since 1989 appear to have stabilised somewhat, particularly since 1999, and this may be related to implementation of the Phosphorus Regulations by Cork County Council. Site 1300 represents an exception to this pattern. Continued enforcement of the Regulations, including remedial works and

improved management of WWTPs and better agricultural management, coupled with the imminent preparation of the southwest river basin district management plan, is likely to encourage further recovery of the Womanagh and its tributaries.

8.8 In association with several authorities, the EPA carry out annual monitoring at 25 of the largest estuaries around the country. Monitoring is carried out in order to identify sensitive areas in the context of the Nitrates and Urban Waste Water Treatment Directives discussed below. While the monitoring programme does not include the Womanagh estuary, Youghal Bay into which the Womanagh discharges is included. Available information indicates that water quality in Youghal Bay is generally satisfactory, despite some evidence of eutrophication in the lower estuary of the River Blackwater. No data are available specifically for the Womanagh estuary.

9. SITE SURVEYS

9.1 A number of surveys were undertaken along the Womanagh catchment: catchment assessment, physicochemical survey and biological survey. The results of the catchment assessment have been described in section 2. The remaining surveys are discussed below. The Ballymacoda environment was assessed in 2002. Investigations carried out during the preparation of this report suggest that little or no changes have occurred here, and thus results obtained previously are applied below.

9.2 *Physicochemical survey*

9.2.1 In order to determine the current water quality in the Womanagh catchment, water samples were taken during February and March 2006 at eight locations as indicated in table 9.1 and figure 1, and forwarded to Consultus Laboratories for analysis. Results of analysis are presented in table 9.2. Due to complex flow dynamics at Ballymacoda attributable to tidal operation of a sluice, no samples were taken here and results recorded during 2002 are used.

9.2.2 The sample taken upstream of Mogeely village indicated that water quality was generally satisfactory at the time of sampling with the exception of nitrate which was slightly elevated. Results of analysis on sample W2, taken downstream of all possible discharges from the village and Dairygold plant, were broadly similar. The orthophosphate level recorded downstream was markedly lower however.

Table 9.1 Sampling locations.

Station	Location	Comments
W1	150 m upstream of Mogeely village	Chemical and biological surveys were carried out at the same locations. Biological monitoring is most accurate when water flow is fast and there is a hard, mixed substratum. Where possible deep flows and muddy sites are avoided. Due to the necessity of avoiding unsuitable sites monitoring was carried out at varying distances upstream and downstream of discharges and settlements.
W2	50 m downstream of Mogeely village and all discharges including Dairygold	
W3	20 m upstream of Castlemartyr village	
W4	45 m downstream of discharge from Castlemartyr WWTP	
W5	10 m upstream of all discharges from Ladysbridge village	
W6	15 m downstream of discharge from Ladysbridge WWTP	
W7	50 m upstream of all discharges from Killeagh village	
W8	35 m downstream of all discharges from Killeagh village	

Table 9.2 Water quality in Womanagh catchment February and March 2006.

Parameter	Mogeely		Castlemartyr		Ladysbridge		Killeagh		Limits
	W1	W2	W3	W4	W5	W6	W7	W8	
pH	7.8	7.9	7.9	7.9	7.8	7.7	7.8	7.7	6.0-9.0 ¹
BOD (mg/l)	<2	3	<2	<2	<2	<2	<2	<2	5 ² 7 ³
SS (mg/l)	<5	7	<5	13	22	12	<5	<5	50 ²
Cond. (µs/cm)	244	254	352	378	463	244	216	217	1000 ⁴
NO ₃ (mg/l N)	6.2	6.7	6.9	6.8	7.5	7.3	4.9	4.9	-
NO ₂ (mg/l N)	0.01	<0.01	<0.02	0.02	0.03	0.02	0.01	0.01	-
oPO ₄ (mg/l P)	0.02	<0.01	0.50	0.49	0.36	0.40	0.02	0.03	0.03 (Q4) ⁵ 0.02 (Q4-5) ⁵

¹Freshwater Fish Directive – salmonid waters

²Surface Water Directive – A1 waters

³Surface Water Directive – A3 waters

⁴Surface Water Directive – A1-A3 waters

⁵Phosphorous Regulations

9.2.3 The concentrations of nitrate and orthophosphate measured upstream of Castlemartyr were elevated. Levels recorded downstream of the village and WWTP discharge were similar. Orthophosphate concentrations at both sites were almost identical.

9.2.4 At Ladysbridge, orthophosphate levels were elevated upstream and downstream of the village. Suspended solid concentrations were also raised, and some cloudiness was noted at the upstream site, most likely due to

local impacts further upstream. No significant differences were noted between the upstream and downstream results.

9.2.5 Results obtained from Killeagh indicated satisfactory water quality at both upstream and downstream sites. Nitrate levels were particularly satisfactory and lower than measured elsewhere in the catchment.

9.3 Biological survey

9.3.1 Biological monitoring was carried out at a number of locations on the rivers and Q values were assigned on the basis of macroinvertebrate density and diversity found. The objectives of the biological survey were:

- A. To determine the background water quality upstream of the specific discharges at each location.
- B. To determine the effects of the existing discharges.
- C. To assess biological quality at locations not included in the EPA monitoring programme.

9.3.2 Samples were taken during March 2006 at nine locations as indicated in table 9.3 and figure 1. Table 9.3 also includes the biological indices recorded. The species list recorded is presented in appendix 5. Saline and tidal conditions at Ballymacoda preclude the use of biological indices here.

Table 9.3 Q values recorded March 2006.

Station	Location	Q value
B1	150 m upstream of Mogeely village	4-5
B1A	50 m downstream of Mogeely WWTP discharge	4-5
B2	50 m downstream of Mogeely village and all discharges including Dairygold	4-5
B3	20 m upstream of Castlemartyr village	4
B4	45 m downstream of discharge from Castlemartyr WWTP	4
B5	10 m upstream of all discharges from Ladysbridge village	4-5
B6	15 m downstream of discharge from Ladysbridge WWTP	3-4
B7	50 m upstream of all discharges from Killeagh village	4-5
B8	35 m downstream of all discharges from Killeagh village	4

9.3.3 At Mogeely Q values of 4-5 were assigned to all three sites. Pollution sensitive genera found included the stoneflies *Isoperla*, *Chloroperla* and *Protonemura*, and the mayflies *Rhithrogena* and *Ecdynurus*. Trout were noted within the watercourse at sites B1 and B2, stone loach at B1A, and the rare brook lamprey (listed in annex 2 of the Habitats Directive) at B1 and B3.

9.3.4 Brook lamprey was also recorded at station B3 upstream of Castlemartyr. Due to the silted nature of the river bed downstream of the village it was necessary to move 45 m downstream of the WWTP outfall to obtain an area of gravels with relatively turbulent water. A Q value of 4 was assigned here although diversity was relatively low.

9.3.5 A Q value of 4-5 was assigned upstream of Ladysbridge reflecting the relatively high number of sensitive species recorded. Pollution sensitive genera included the stoneflies *Isoperla*, *Chloroperla* and *Protonemura*, and the mayflies *Rhrithrogena*. Trout were noted within the watercourse immediately downstream of B5. It was noted that the discharge from the WWTP at Ladysbridge is clearly impacting on water quality, and sewage fungus was noted along the river bed downstream of the discharge point. This has reduced macroinvertebrate density and diversity, resulting in a lower Q value of 3 at B6.

9.3.6 Sensitive macroinvertebrate species were noted at both Killeagh stations and a Q value of Q4-5 was assigned upstream of the town. The discharge from the existing WWTP would appear to impacting on local water quality and a build up of silt was evident at the discharge point. However water quality was found to be satisfactory 35 m downstream of the discharge point where a Q4 was assigned.

9.3.7 The Dairygold facility at Mogeely discharges during the period from March to September, and thus there may be seasonal impacts on water quality. To determine if there is a greater impact on the watercourse when the plant is discharging and water levels are low, additional biological monitoring was carried out at three locations in September 2006. Results are detailed below in table 9.4.

Table 9.4 Q values recorded September 2006.

Station	Location	Q value September 2006	Q value March 2006
B1	150 m upstream of Mogeely village	4	4-5
B2	50 m downstream of Mogeely village and all discharges including Dairygold	3	4-5
B3	20 m upstream of Castlemartyr village	3-4*	4

*Borderline Q3 and Q3-4. Assigned Q3-4 on basis of small numbers of *Ephemera* sp.

9.3.8 Table 9.4 indicates that there was a significant change in Q values obtained at these locations. The Q value upstream of Mogeely decreased from 4-5 to 4. This may be due to seasonal factors. It is noted that the summer of 2006 was characterised by low rainfall and low flows in watercourses. The fall in Q values at both downstream sites was more extreme. No stonefly or heptageniid mayflies were detected at either location, and the dominant groups/species were *Gammarus* sp. and *Hydropsyche* sp., with smaller number of *Lymnea* sp. *Asecellus* sp. and tubificid worms were also detected. A Q value of 3 was assigned to the site closest to Mogeely, and Q3-4 was assigned to the site 20 m upstream of Castlemartyr. The results suggest that the seasonal discharge from Dairygold at Mogeely is impacting on water quality.

9.4 Ballymacoda

9.4.1 Results of investigations on the Ballymacoda River and Womanagh River (Crompaun Bridge) in 2002 revealed the following water quality parameters:

Table 9.5 Ballymacoda water quality 2002.

Location	Ballymacoda River upstream of WWTP stream	Ballymacoda River downstream of WWTP stream	Womanagh
pH	7.5	7.5	7.3
BOD mg/l	<1	<1	<1
SS mg/l	5	5	20
NH ₄ mg/l N	0.08	0.09	0.15
NO ₃ mg/l N	2.3	2.3	4.3
MRP mg/l P	0.06	0.05	0.3
Total P mg/l P	0.09	0.12	0.5

9.4.2 Results indicated that water quality in the Ballymacoda River was satisfactory, despite receiving a discharge of dubious quality from the local WWTP via a short stream. Results obtained from the Womanagh sample were generally unsatisfactory and indicative of eutrophication. It was not possible to undertake biological assessments of these sites.

10. NOISE & ODOUR

10.1 All five WWTP sites under consideration are located near public roads in the environs of their respective villages. The noise environment at each location is therefore influenced to some degree by traffic. Occasional noise emissions arise from other sources such as playing children, agricultural machinery, birds and rustling vegetation. Building work may also elevate noise levels on occasions and there will be some small scale industrial activity at Castlemartyr.

10.2 There are no significant point sources of air emissions in the vicinity of the WWTP sites, and site observations made during the preparation of this report indicate that air quality in the environs of Mogeely, Castlemartyr, Ladysbridge, Killeagh and Ballymacoda is satisfactory. There are no significant industrial or commercial zones of significance within the catchment.

11. INTERPRETATION: EXISTING ENVIRONMENT

11.1 This section provides a summary and analysis of information documented in part 1 (sections 2 to 10) regarding the existing environment.

11.2 The discharge from the WWTP in Mogeely was relatively small when observed during the preparation of this report. Visually there was no evidence of a significant impact on water quality. A high volume discharge to the river of heated water, with concomitant surface foam, was observed downstream of the bridge in Mogeely. There may also be additional discharge(s) from the Dairygold plant. While it is possible that discharges from the Dairygold plant may be having an impact on water quality, a biological sample downstream of the plant in March 2006 did not indicate negative impacts, and a satisfactory Q value of 4-5 was awarded. A Q4-5 value was also assigned upstream of the village, suggesting that discharges from the village and Dairygold treatment plants were not significantly affecting water quality during March.

11.3 The Dairygold facility discharges during the period from March to September. A second biological assessment undertaken in September detected reduced Q values upstream and downstream of Mogeely. The most significant reductions were measured downstream, where both sites were assigned Q3 values. It is concluded that the seasonal discharge is most likely impacting on water quality in the river.

11.4 The Q4-5 values recorded in the vicinity of Mogeely during the preparation of this report contrast with those recorded by the EPA during their 2005 monitoring programme. The closest EPA monitoring station upstream of Mogeely (station 19W01 0700) was assigned a Q4 in 2005, while a Q3-4 was assigned downstream at Castlemartyr Bridge. The lower Q values recorded by the EPA, who undertake their monitoring during summer months, may reflect more significant impacts on water quality during the height of the summer. The Q values are similar to those recorded by DixonBrosnan in September 2006.

11.5 In the interests of maintaining a conservative approach, the Q4 value recorded upstream by the EPA will be applied in this report in the assessment of assimilative capacity at Mogeely. This approach is supported by the median MRP concentration calculated from Cork County Council monitoring data presented in table 7.1; the median concentration of 0.0335 mg/l P approximates to a Q4 value, indicating fair water quality. It should be noted that the nitrate concentrations recorded by Cork County Council (median 6.09 mg/l N and mean 6.16 mg/l N) are also indicative of fair water quality. A Q4 was assigned to this location by DixonBrosnan in 2006.

11.6 Cork County Council and the EPA include Castlemartyr Bridge in their routine monitoring programmes. A number of discharge pipes are evident upstream of the bridge, possibly associated with surface water runoff from several dwellings and a small industrial estate located upstream of the village. It is probable that discharges arise via these outfalls periodically. The impact on the watercourse from these discharges is not known; they may

possibly be the cause of dense stands of water crowfoot here. It is possible that dissolved oxygen levels in this stretch of the Kilttha River fall significantly during low summer flows.

11.7 The EPA assigned a Q value of 3-4 to Castlemartyr Bridge in 2005. This figure contrasts with the Q value of Q4-5 assigned by DixonBrosnan at a site 20 m upstream of the village. The protected species brook lamprey was observed at this site, and it was noted that growth of water crowfoot is considerably less dense here than at the bridge. However, repeat sampling by DixonBrosnan in September 2006 found that water quality had deteriorated and a Q value of 3-4 was assigned. Given that levels of MRP are high (a median of 0.069 mg/l from Cork County Council data) a Q value of 3-4 is considered a reasonable estimate of water quality upstream of Castlemartyr.

11.8 The nearest monitoring station used by the EPA and Cork County Council upstream of Ladysbridge is Castlemartyr Bridge where a Q3-4 value was awarded in 2005. A closer station used by DixonBrosnan during the preparation of this report, located 10 m upstream of all village discharges, was assigned a Q value of 4-5 indicating fair-good quality. Due to possible seasonal fluctuations in water quality, a conservative Q4 value is applied in the assimilative capacity assessment below. It should be noted that the Q3-4 value recorded immediately downstream of the Ladysbridge WWTP discharge, and the poor aesthetic quality of the watercourse, suggests that the existing WWTP discharge is impacting on water quality.

11.9 As before, the Q4 value assigned in 2005 by the EPA to their monitoring station at Killeagh Bridge is lower than the Q4-5 value awarded by DixonBrosnan to a station upstream of the village. Again, the more conservative Q4 value is applied below. Cork County Council monitoring data recorded between 2002 and 2005 are indicative of good water quality at Killeagh Bridge, with a median MRP concentration of 0.027 mg/l P, and nitrate levels of 4.42 mg/l N (mean) and 4.34 mg/l N (median).

11.10 DixonBrosnan report 02001 which described an assessment undertaken at Ballymacoda in 2002 concluded that there were no ready discharge options available to surface watercourses in this area. Given the severely restricted dilution capacities available locally, it was concluded that a discharge to the tidal section of the Womanagh River represented the only option consistent with all water quality criteria. A practical alternative, discharging to the Ballymacoda River, would not specifically meet the dilution criterion. Q values and short term physicochemical assessments are of reduced relevance here due to tidal influence, and thus this area was not resampled during the preparation of this report. The conclusions of the original report are still considered relevant, and it is likely that specific engineering solutions will be necessary here to allow further development at Ballymacoda.

11.11 Background levels of the most relevant parameters at Mogeely, Castlemartyr, Ladysbridge and Killeagh are presented in table 11.1. BOD concentrations are taken from water samples collected during the preparation of this report. Laboratory reporting obligations resulted in BOD analysis data presented as <2 mg/l; a level of 2 mg/l is applied below to maintain a conservative approach. As a short term event most likely affected water quality upstream of Ladysbridge, the suspended solids level applied here is taken from the next upstream sampling station at Castlemartyr. Nitrate and ammonium levels at Castlemartyr are also applied to Ladysbridge as Cork

County Council do not maintain a sampling station at the latter. All nitrate and ammonium concentrations presented are median values of Cork County Council data recorded between 2002 and 2005. MRP concentrations are derived from the conservative Q values applied at each site as discussed above.

Table 11.1 Background concentrations of key parameters at four inland settlements.

Location	95% flow m ³ /s	BOD mg/l	SS mg/l	NH ₄ mg/l N	NO ₃ mg/l N	MRP mg/l P	Q value
Mogeely	0.0329	2	5	0.021	6.09	0.03	4
Castlemartyr	0.0363	2	5	0.026	6.23	0.05	3-4
Ladysbridge	0.0545	2	13	0.026	6.23	0.03	4
Killeagh	0.0487	2	5	0.021	4.34	0.03	4

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12. SURFACE WATER DIRECTIVE

12.1 Council Directive 75/440/EEC concerning the quality of surface water intended for the abstraction of drinking water in the member states was incorporated into Irish law by the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989 (SI No. 294 of 1989). The Regulations set out quality standards for a total of 39 parameters for waters which are to be treated for distribution, with the standards varying with the degree of treatment provided. The Regulations divide surface waters from which water for public supply will be taken into three categories; these categories are based on the degree of treatment which will be applied. The degree of treatment for the three categories A1, A2 and A3 are as follows:

- A. Simple physical treatment and disinfection eg. rapid filtration and disinfection.
- B. Normal physical treatment, chemical treatment and disinfection eg. prechlorination, coagulation, flocculation, decantation, filtration, chlorination.
- C. Intensive physical and chemical treatment, extended treatment and disinfection eg. chlorination to break point, coagulation, flocculation, decantation, filtration, adsorption, ozone/UV disinfection, chlorination.

12.2 As the degree of treatment is based on the quality of water to be abstracted there are obvious financial implications should the water quality deteriorate to such a degree that it moves into an A2 or A3 classification.

12.3 The only surface water abstraction within the Womanagh catchment is on the Dower River at Dower. There are no discharges to this river, either upstream or downstream of its 2 km subterranean stretch. Consequently the provisions of the Surface Water Directive do not directly apply.

13. BATHING WATER DIRECTIVE

13.1 Council Directive 76/160/EEC concerning the quality of bathing water, and the follow up Quality of Bathing Waters Regulations 1992 (SI No. 155 of 1992) and amendments, lay down quality requirements for inland and coastal waters as designated bathing areas. The quality standards refer chiefly to microbiological parameters, with provision for monitoring of other parameters where it is suspected that conditions have deteriorated. Microbiological limit values specified in the Directive and Regulations are listed in table 13.1.

Table 13.1 Bathing waters limits (per 100ml).

Legislation	Total coliforms	Faecal coliforms	Faecal streptococci
Directive 76/160/EEC	500 ¹ 10,000 ²	100 ¹ 2,000 ²	100 ³
SI No. 155 of 1992	5,000 ¹ 10,000 ²	1,000 ¹ 2,000 ²	300 ^{2,4}

¹Compliance by 80% of samples

²Compliance by 95% of samples

³To be measured where present or where deterioration suspected

⁴Compliance by 90% of samples

13.2 There are no designated inland bathing areas in the Womanagh catchment nor any designated beaches on the Womanagh estuary. Consequently Directive 76/160/EEC and SI No. 155 of 1992 do not directly apply.

13.3 The final kilometre of the Womanagh River flows through a strand which extends 5 km northeast to Youghal along the Youghal Bay coastline. A number of bathing areas are located along this strand, the nearest being at Pillmore. While Pillmore strand is not designated under the Regulations, the strand is of some recreational value and therefore deserves some degree of protection. To the north of Pillmore lie three designated beaches: Redbarn, Claycastle and Youghal main beach. A review of monitoring data indicates that satisfactory conditions have been recorded by Cork County Council at Claycastle and Youghal for several years. Slightly poorer quality has been noted at Redbarn however, and in 2004 (year for which most recent data are available) the water quality here did not meet EU guide values, although mandatory values were met.

13.4 It is likely that the Bathing Waters Directive will be replaced shortly. The new Directive will contain only two microbiological parameters, limits for which will be stricter than those currently in force. It is therefore possible that many beaches around Ireland, including those along Youghal Bay, will be less likely to be awarded satisfactory status in the future. It is expected that fewer Blue Flags will be awarded during subsequent years. In order to guarantee the retention of satisfactory status at Claycastle and Youghal, and the necessary improvement at Redbarn, it is essential that existing and proposed wastewater discharges to Youghal Bay feed rivers meet relevant microbiological criteria. With respect to the Womanagh River and the settlements under consideration, these microbiological criteria apply chiefly to the discharge at Ballymacoda.

14. FRESHWATER FISH DIRECTIVE & SALMONID REGULATIONS

14.1 Council Directive 78/659/EEC on the quality of fresh waters needing protection in order to support fish life was given Irish effect by the European Communities (Quality of Salmonid Waters) Regulations 1988 (SI No. 293 of 1988). The Regulations specify a separate range of standards for salmonid and cyprinid fish in waters designated as needing protection or improvement for their support.

14.2 Neither the Womanagh River nor its tributaries have been designated under the Regulations and it is not expected that they will be designated in the immediate future. The fisheries significance of the catchment has been discussed in section 5.

14.3 Notwithstanding the absence of any fisheries designation, the Freshwater Fish Directive carries some weight due to its strict limits and the consequent suitability of a watercourse for other uses should it meet these limits. The most significant wastewater parameters are examined in table 14.1 with respect to the Directive.

Table 14.1 Freshwater Fish Directive limits.

Parameter	Limit mg/l	
	Salmonid	Cyprinid
BOD	3	6
Suspended solids	25	25
Ammonia	0.02 N ¹ 0.82 N ²	0.02 N ¹ 0.82 N ²
Nitrite	0.003 ³	0.009 ³
Nitrate	- ⁴	- ⁴
Orthophosphate	- ⁴	- ⁴
Total phosphorus	0.062 ⁵	0.124 ⁵

¹Un-ionised ammonia

²Total ammonium

³Guide value, no mandatory limit specified

⁴No limit given

⁵Not specified as limit but rather 'may be regarded as indicative in order to reduce eutrophication'.

14.4 It is recommended where practical that the cyprinid criteria listed in table 14.1 are applied in assessing impacts of the existing and proposed discharges at the settlements under consideration.

15. SHELLFISH DIRECTIVE

15.1 Council Directive 79/923/EEC on the quality required by shellfish waters, and the associated Quality of Shellfish Waters Regulations 1994 (SI No. 200 of 1994) specify designated coastal and brackish waters needing protection or improvement in order to support shellfish. Specified limit values apply to these areas. There are no designated shellfish areas on this stretch of the Irish coastline and thus the Directive and Regulations do not apply.

15.2 Pursuant to Council Directive 91/492/EEC laying down the health conditions for the production and the placing on the market of live bivalve molluscs, the Minister for the Marine and Natural Resources issued a list of

production areas from which molluscs may be taken. Included in the list is Youghal Bay from which mussels are harvested. Under this designation shellfish tissue is required to contain limited numbers of faecal coliforms. It is noted that live bivalve molluscs must not exceed, in 90% of samples, the limits of a five tube three dilution MPN test of 6000 faecal coliforms per 100 g of flesh, or 4600 E. coli per 100 g of flesh.

15.3 While the Live Bivalve Molluscs (Production Areas) Designation of 2004 does not include Youghal Bay, it is advisable that the proposed wastewater treatment projects at the settlements under consideration in this report result in an improvement in microbiological quality of the discharged effluent. No deterioration should be allowed to occur. This recommendation particularly applies with respect to Ballymacoda, the closest discharge point to Youghal Bay.

16. URBAN WASTE WATER TREATMENT DIRECTIVE

16.1 The Environmental Protection Agency Act 1992 (Urban Waste Water Treatment) Regulations 1994 (SI No. 419 of 1994) were issued to give effect to EU Council Directive 91/271/EEC concerning urban wastewater treatment. The Regulations specify that wastewater arising from populations of less than 2000 shall, by the end of 2005, be subject to appropriate treatment prior to discharge. Appropriate treatment is defined as:

...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.

16.2 Relevant Community Directives are Directives 75/440/EEC, 76/160/EEC, 78/659/EEC and 79/923/EEC, all of which have been discussed above.

16.3 This requirement applies to freshwater and estuarine discharges. It also applies to coastal discharges from agglomerations of less than 10000. Where the agglomeration served is over 2000 pe (10000 pe if coastal) the second schedule of the Regulations notes that final concentrations of BOD and suspended solids in the treated discharge shall not exceed 25 mg/l and 35 mg/l respectively.

16.4 The wastewater loads arising at Mogeely, Castlemartyr, Ladysbridge, Killeagh and Ballymacoda are in all cases less than 2000 pe at present. It is proposed to upgrade the plants to cater for increased loads; only at Castlemartyr will the proposed capacity exceed 2000 pe. Regardless of the size of the load proposed, the limits specified in the Urban Waste Water Treatment Directive are not considered onerous, and compliance with stricter articles of legislation such as the Fisheries Directive will ensure compliance with the Urban Waste Water Treatment Directive.

16.5 The Directive notes in annex IIA that a water body (freshwater, estuarine or coastal) must be identified as a sensitive area if certain criteria are met and to where treated waste from agglomerations of greater than 10000 pe will discharge. Neither the Womanagh River nor Youghal Bay has been designated as a sensitive area, although the Blackwater Estuary to Youghal Harbour area has been designated under the Environmental Protection Agency Act 1992 (Urban Waste Water Treatment) Regulations 2001 (SI No. 254 of 1994). The designation process is directed at agglomerations significantly larger than that under consideration with respect to the Womanagh catchment.

16.6 The Directive specifies a number of obligations regarding the design of wastewater treatment plants as follows:

- A. Such plants shall be designed, constructed, operated and maintained to ensure sufficient performance under all normal local climatic conditions.
- B. When designing the plants, seasonal variations of the load shall be taken into account.
- C. Waste water treatment plants shall be designed or modified so that representative samples of the incoming wastewater and of treated effluent can be obtained before discharge to receiving waters.
- D. The points of discharge of urban wastewater shall be chosen, as far as possible, so as to minimize the effects on receiving waters.

16.7 It is recommended that items A-C are taken into account at the design and installation stage of the proposed wastewater treatment projects under consideration. Item D is addressed in this report.

17. PHOSPHORUS REGULATIONS

17.1 The Local Government (Water Pollution) Act 1977 (Water Quality Standards for Phosphorus) Regulations 1998 (SI No. 258 of 1998) were introduced to counter eutrophication observed throughout Irish watercourses and also to comply with Council Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment.

17.2 The Regulations oblige local authorities to maintain or improve the water quality at any part of a river by 2007 with reference to the biotic index (Q value) or to the concentration of molybdate reactive phosphate (MRP, largely orthophosphate). The target values specified are set out in the third schedule of the Regulations and are reproduced in table 17.1.

Table 17.1 Phosphorus Regulations target values.

Q values at 1997	Either to be applied	
	Target Q value	Target MRP level µg/l
5	5	15
4-5	4-5	20
4	4	30
3-4	4	30
3	3-4	50
2-3	3-4	50
≤2	3	70

17.3 In practical terms indices of Q4 or higher are taken to represent satisfactory water quality and where eutrophication is unlikely to be a problem. Because annual median phosphate values in such waters rarely exceed 30 µg/l P, this concentration has been adopted as the general target value to be achieved by 2007. The empirical relationship between phosphate and eutrophication suggests that, once annual MRP levels exceed 30 µg/l P, there is a strong statistical likelihood that the stretch of river in question will have a significant eutrophication problem.

17.4 On the basis of Q value information available for the Womanagh catchment (presented in tables 8.2 and 8.3), target values to be met by 2007 are indicated below.

Table 17.2 2007 target Q values in Womanagh catchment.

River	Station	Location	1997 Q value	2007 Target	2005 Q value	P Regs.
Dissour	0200	Br WSW of Ballyre	4	4	4	Compliant
	0400	Killeagh Br	4-5	4-5	4	Non-compliant
	0600	Br u/s Womanagh confl	3-4	4	4	Compliant
Kiltha	0300	Br WNW of Donickmore Ho	4	4	4	Compliant
	0500	Br NE of Dungourney	3-4	4	4	Compliant
	0700	Second Br N of Mogeely	4-5	4-5	4	Non-compliant
	1000	Br in Castlemartyr	3-4	4	3-4	Non-compliant
Womanagh	1300	S of Ballyhonock Lake	3-4	4	3	Non-compliant

17.5 Four sampling stations were not on course to meet the target at 2005. It was noted in 8.7 that three of these were affected to some degree by wastewater discharges. In this context, any proposals to upgrade or improve the respective WWTPs may be seen as a positive step.

17.6 The target values Q specified in the Regulations were adopted on the basis of the empirical relationship between the biotic indices and orthophosphate concentrations in Irish waters as monitored extensively by the

EPA. Some concern has been expressed that this simplistic approach does not apply equally throughout Irish watercourses, with consequent complications in the assessment of existing and proposed discharges. It is noted that the empirical correlation between Q4 status and an orthophosphate level of 0.03 mg/l P does not hold true for all situations. Elevated orthophosphate levels affect watercourses by causing eutrophication which in turn causes depletion of oxygen levels. Rivers are dynamic and variable systems however, and high phosphate levels are not always correlated with low oxygen concentrations. For example the presence of turbulent water, waterfalls or weirs may prevent significant deoxygenation of water, while shaded conditions will affect plant and algal growth. Moreover, orthophosphate concentrations may fluctuate considerably over time and the use of a limited number of samples/results may provide a misleading picture of water quality at a given location.

17.7 It follows that Q values, rather than orthophosphate concentrations, are often better indicators of long term water quality in a watercourse. Q values also provide a better indication of the real impact of water quality on the ecology of the watercourse. Invertebrates are valuable as indicator species, and information on the diversity and density of invertebrates can provide an accurate assessment of the suitability of the monitoring location for species such as fish.

17.8 While the Phosphorus Regulations are directly applicable to the current study, limited orthophosphate data are available with respect to the Womanagh catchment and these results may not provide accurate information on long term trends within the catchment. Given the reliability of Q values over longer periods, these values are considered more relevant as a basis for determining background orthophosphate levels.

18. NITRATES DIRECTIVE

18.1 Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources obliges member states to identify Nitrate Vulnerable Zones within which restricted agricultural practices will apply. Zone designation is undertaken by reference to a number of criteria listed in annex I of the Directive including excessive nitrate concentrations in surface or ground waters and high trophic status. With respect to surface waters, the Directive notes that sensitive waters shall be identified where nitrate levels exceed the maximum concentration specified in the Surface Water Directive ie. 11.3 mg/l N.

18.2 A limit of 11.3 mg/l N may be considered high, and allowing nitrate concentrations to rise towards this limit is not desirable. In this context a guideline value equal to 50% of the mandatory value is considered an appropriate target value. This equates to 5.65 mg/l N, or 25 mg/l NO₃.

18.3 Under Ireland's implementation of the Nitrates Directive, the whole country has been designated as a Nitrate Vulnerable Zone and limited to a 170 kg/ha/year application limit of animal manure or fertiliser. However a derogation is being sought for a 250 kg/ha/year limit.

19. ROYAL COMMISSION STANDARDS

19.1 The standards noted in the *Eight Report of the Royal Commission on Sewage Disposal* (1912) have played an important part in water quality management since their publication. The standards are summarised in table 19.1.

Table 19.1 Royal Commission standards, 1912.

Dilution	Standard mg/l		Treatment required
	BOD	Suspended solids	
8-150	20	30	Primary & secondary
150-300	-	60	Chemical precipitation
300-500	-	150	Plain sedimentation
>500	-		No treatment

19.2 The normal standard fixed was 20 mg/l BOD and 30 mg/l suspended solids. The Commission did not include a quality standard for receiving waters in their recommendations, but noted that river waters with a BOD of 4 mg/l will be ordinarily free from signs of pollution. In accordance with the Commission's report, most river authorities have traditionally sought a minimum dilution of 1:8 in the discharge of treated wastewater to a watercourse, regardless of treatment efficiency. It is noted however that the Royal Commission Report dates to 1912 when a treatment standard of less than 20/30 was difficult to obtain.

19.3 The Commission standards formed the basis for *Memorandum no. 1: Water quality guidelines* (1978) issued by the Irish Department of the Environment Technical Committee on Effluent and Water Quality Standards. The majority of quality standards specified in the memorandum have since been superseded by more recent legislation and standards such as those described on previous pages.

19.4 *Memorandum no. 1: Water quality guidelines* also makes reference to dilution capacities within estuaries. The report notes that, due to complex dynamics with estuaries, dilution capacities therein are more safely determined using freshwater flow data. The report also states that a limit of 200 mg/l BOD may be discharged to a closed estuary such as the Womanagh where the daily discharge does not exceed 45 kg BOD.

20. WATER FRAMEWORK DIRECTIVE

20.1 EU Directive 2000/60/EC establishing a framework for Community action in the field of water policy requires member states to restore the quality of their watercourses by 2015. In order to achieve this objective, Irish local authorities are obliged to prepare river basin management plans. Cork County Council have assembled an advisory council which will manage the southwest river basin district within which the Womagh catchment is located. In the meantime there are no specific quality objectives in force with respect to the catchment.

20.2 The Water Framework Directive includes a substantial set of provisions which member states are obliged to apply. The provisions chiefly relate to the categorising of water bodies within each river basin district. While no specific standards are specified with respect to water quality criteria and discharges to waters, the Directive states that due regard is to be given to relevant Community Directives. In particular, the Water Framework Directive notes that the most stringent limits should be applied where more than one set of criteria are relevant. This approach is adopted within the current assessment.

21. NOISE & ODOUR

21.1 There are no national noise limits in place in Ireland. Most developments are usually restricted by way of noise conditions in relevant planning permissions or Environmental Protection Agency licences. In the granting of permission to developments, authorities will often refer to the EPA document *Integrated Pollution Control Licensing: Guidance note for noise in relation to scheduled activities* (1995) which notes that the noise level at a sensitive location should be kept below an L_{Ar} value of 55 dB during the hours 0800-2200, and below 45 dB outside of these hours, the L_{Ar} being equal to the L_{Aeq} (the average noise level) plus a penalty applied where the noise is tonal or impulsive. The guidance note states in particular that audible tones and impulsive noise at sensitive locations should be avoided at night, irrespective of the noise level.

21.2 The EPA guidance note defines a noise sensitive location as:

Any dwelling house, hotel or hostel, health building, educational establishment, places of worship or entertainment, or any other facility or area of high amenity, which for its proper enjoyment requires the absence of noise at nuisance levels.

21.3 It follows that any local residence or establishment, internally and externally, in the vicinity of any of the WWTP sites under consideration is a noise sensitive location within the terms of the guidance note.

21.4 While the EPA document was prepared as a guidance note for activities specified only in the first schedule to the EPA Act (1992) and subsequently in follow up orders, the absence of other Irish guides or standards lends the document some significance and consequently the document now carries some weight outside of the industrial sectors regulated by the EPA.

21.5 There are no odour limits specified in Irish legislation, and only the Air Pollution Act 1987 makes any reference to odour nuisance. In the absence of any limits, the EPA in their document *Wastewater treatment manuals: Treatment systems for small communities, business, leisure centres and hotels* (1999) has recommended minimum buffer zones to be applied around WWTPs over certain threshold pe values. The zones have been selected to reduce both odour and noise impacts. The document notes that for systems designed to treat greater than 161 pe a buffer zone of 50 m should allowed ie. the WWTP should not be located nearer than 50 m to existing development. It is further noted that at least 30 m of this distance should be in the possession of the WWTP operator.

22. INTERPRETATION: LEGISLATION & STANDARDS

22.1 This section provides a summary and analysis of information documented in part 2 (sections 12 to 21) regarding legislation and standards pertinent to the proposed developments and the aquatic environment.

22.2 The Urban Waste Water Treatment Directive specifies that due regard should be given to other European Directives in the assessment of impacts associated with wastewater discharges. The Water Framework Directive further states that where a number of limits are relevant through various Directives, the most stringent should be applied. The only Community Directive directly applicable to the Womanagh catchment is the Nitrates Directive which has been applied across the country.

22.3 Two Directives are not directly relevant to the catchment, yet are relevant to Youghal Bay into which the Womanagh discharges. These are the Bathing Waters Directive and the Bivalve Molluscs Directive. Both Directives, with their follow up national Regulations, specify microbiological criteria applicable respectively to beaches and shellfish. These criteria are of relevance to the assessment of Ballymacoda WWTP. The distance inland to the remaining WWTPs is such that the microbiological criteria will not apply to Mogeely, Castlemartyr, Ladysbridge or Killeagh.

22.4 The Fisheries Directive and associated Salmonid Regulations apply only to designated watercourses and consequently do not apply to the Womanagh system. However, the strict limits specified in these instruments means that compliance with same will guarantee compliance with other limits and therefore suitability for other uses. This approach is also in keeping with the thrust of the Water Framework Directive. It is thus recommended that the cyprinid Freshwater Fish Directive limits are applied from the outset.

22.5 In the absence of any adopted catchment management plan or river basin management plan, the Phosphorus Regulations assume an important role in overall water quality across the catchment. The Regulations specify target Q values to be met by 2007 at selected sites on the Womanagh system. Any works undertaken with respect to the five WWTPs under consideration should aid compliance with these targets.

22.6 Guidance on noise and odour control is provided by two EPA documents; the maintenance of buffer zones of at least 50 m around each WWTP under consideration should guarantee compliance with these. Remaining legislative or guidance documents discussed in part 2 do not apply, due to their being irrelevant (Surface Water Directive and Shellfish Directive) or superseded (Royal Commission standards).

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23. IMPACT ASSESSMENT

23.1 The impacts of the proposed discharges to the Womanagh system are assessed below under a number of headings: waste assimilative capacity and BOD, suspended solids, nitrogen, phosphorus and pathogens.

23.2 Mass balance equations may be used to determine the concentration of a parameter in a watercourse downstream of its discharge. A typical equation is as follows:

$$T = (FC + fc) / (F + f)$$

where:

T = downstream pollutant concentration

F = upstream river flow

C = background pollutant concentration

f = effluent flow

c = effluent pollutant concentration

23.3 It is noted that the relationship between water quality and the ecological health of a watercourse is complex and that the impact of a specific discharge cannot be predicted with a high degree of certainty. It is also noted that the use of formulae does not provide conclusive answers, particularly as such calculations are often based on limited data. It is necessary therefore to continually review water quality data to ascertain what changes are occurring within a watercourse.

24. PROPOSED DEVELOPMENTS

24.1 Cork County Council operates a sewage scheme in the villages of Mogeely, Castlemartyr, Ladysbridge, Killeagh and Ballymacoda. The Council proposes to upgrade the level of treatment provided by the WWTPs at these villages as required, and to install additional treatment capacity to facilitate future development. The proposed works are summarised in table 24.1.

Table 24.1 Summary of proposed WWTP works.

Location	Description	Existing load pe	Proposed capacity pe	Proposed volume m ³ /day
Mogeely	WWTP with secondary treatment, 200 pe capacity	100	500	90
Castlemartyr	WWTP with secondary treatment, 2000 pe capacity	1500	3000	540
Ladysbridge	Septic tank, overloaded	500	1000	180
Killeagh	WWTP with secondary treatment, 1000 pe capacity	850	2000	360
Ballymacoda	Septic tank, unsatisfactory percolation	500	1000	180

24.2 With respect to Ladysbridge and Ballymacoda it is proposed to divert the existing discharges from the septic tanks to new WWTPs, most likely proprietary units. The provision of extra capacity at Castlemartyr and Killeagh will most likely require the installation of additional components at the existing WWTP sites. It is unclear at this point if new WWTPs will be required, or if the existing plants may simply be upgraded.

24.3 The EPA document *Wastewater Treatment Manuals: Treatment systems for small communities, business, leisure centres and hotels* (1999) notes that research suggests that per capita wastewater flows average 180 l/day, and the document recommends this figure be used. Accordingly this per capita wastewater flow is now accepted as the standard flow to be used in the design of wastewater treatment systems. The volume of wastewater proposed for treatment at each site is presented in table 24.1 above.

24.4 At all five settlements there is minimal industrial input to the wastewater stream. The most significant industrial source of wastewater, a milk processing facility at Mogeely, discharges to an onsite WWTP. Therefore the wastewater stream arising at each village is assumed to be domestic in nature. The characteristics of such wastewater streams have been documented by the EPA (1999) and are summarised in table 24.2. No unusual variations in the wastewater streams have been noted.

24.5 In addition to the new wastewater treatment systems, new or upgraded collection systems may be required so that all discharges are effectively managed. It is recommended that surface water at each settlement is discharged directly to the nearest watercourses. It is advisable that an assessment be carried out of all dwellings and pubs/restaurants etc. to ensure that grey water entry to the surface water systems is limited. If surface water is prevented from entering each WWTP facility, it is recommended that each plant does not allow storm water overflow and that the plant tender specifications include provision for a flow balancing system to cater for flows up to 6 DWF.

Table 24.2 Domestic inflow wastewater characteristics.

Parameter	Mean concentration
SS	163 mg/l
BOD	168 mg/l
COD	389 mg/l
oPO ₄	7.1 mg/l P
Total N	40.6 mg/l N
NH ₃	31.5 mg/l N
NO ₃	0.25 mg/l N
NO ₂	0.04 mg/l N
pH	7.5
Total coliforms	1x10 ⁸ CFU/100ml
Faecal coliforms	4x10 ⁷ CFU/100ml

Source: EPA

25. DISCHARGE OPTIONS

25.1 The septic tank located at Ladysbridge, and the WWTPs at Mogeely, Castlemartyr and Killeagh are located at sites adjacent to the main tributaries of the Womanagh River. The most practical option at these sites is the continued discharge of the treated effluent to the adjacent watercourses, subject to compliance with relevant quality criteria noted in part 2 of this report and the availability of sufficient assimilative capacity. In any case, no suitable alternatives exist at these sites.

25.2 At Ballymacoda the existing septic tank discharges ostensibly to groundwater via a percolation area. An assessment of this site undertaken by DixonBrosnan in 2002 noted that this disposal method was not working satisfactorily, and it was concluded that local conditions do not favour disposal by percolation. While a stream flows in proximity to the septic tank, its low flow and poor quality precludes it from receiving a wastewater stream, regardless of treatment quality. Marine disposal was ruled out on economic grounds. Two feasible disposal options were presented in the report: discharge to the Ballymacoda River, and discharge to the Womanagh River. While disposal to the latter would immediately meet all water quality criteria, installation of an outfall main over 1000 m of difficult terrain would be required. It was concluded that disposal to the Ballymacoda River presented a more practical alternative. Both options are included in the assessment below.

26. DILUTION CAPACITIES

26.1 Cork County Council proposes to increase the treatment capacities of WWTPs at the five settlements under consideration. Table 26.1 presents the dilution factors available at these settlements calculated on the basis of 95th percentile flow data and a per capita wastewater volume of 180 l/day. Both disposal options are shown with respect to Ballymacoda.

Table 26.1 Proposed discharges and dilution factors.

Location	River	Capacity proposed	Commercial discharge pe	95% flow m ³ /s	Dilution factor
Mogeely	Kiltha	500	3610	0.0329	3.8
Castlemartyr	Kiltha	3000	-	0.0363	5.8
Ladysbridge	Womanagh	1000	-	0.0545	26.2
Killeagh	Dissour	2000	-	0.0487	11.7
Ballymacoda	Womanagh	1000	-	0.1389	66.7
Ballymacoda	Ballymacoda	1000	-	0.0069	3.3

26.2 The table indicates that sufficient flows will be available at Ladysbridge and Killeagh to provide greater than a 1:8 dilution of the discharge volumes proposed. The 95th percentile flow of the Kiltha River will not be sufficient to provide a 1:8 dilution of the 3000 pe proposed at Castlemartyr. Calculations indicate that compliance with the 1:8 criterion here will limit the maximum discharge load to 2180 pe. At Mogeely, the discharge from the Dairygold facility significantly reduces the available dilution capacity here.

26.3 At Ballymacoda, only a discharge to the Womanagh will automatically meet the 1:8 criterion. However, as noted in 26.2, a discharge to the Ballymacoda River presents a less impractical option. At its nearest point the Ballymacoda River approaches to within approximately 500 m of the WWTP site. The intervening terrain consists of flat agricultural grassland. The river is slow flowing and exhibits some development of marsh like conditions in parts. The 95th percentile flow of the river was estimated to be 650 m³/day (600 m³/day at the likely location of an outfall from the WWTP), although it was noted that the flow rate follows tidal movements via a sluice gate. The river showed negligible salinity during onsite inspections, and it can be assumed that there is little or no inward flow due to tidal movements. Water quality in the river was observed to be reasonably satisfactory, and it was concluded in DixonBrosnan report 02001 that the river's natural wetland characteristics might favourably be employed in the disposal of treated wastewater arising from a then proposed population load of 600 pe. Cork County Council now proposes to increase the treatment capacity at Ballymacoda to 1000 p.e, resulting in a reduced dilution of 3.3. Unless an innovative engineering solution can be employed, the reduced dilution available will most likely necessitate a direct discharge to the Womanagh River via a 1000 m mains.

26.4 It is noted that the Royal Commission Report dates to 1912 when a treatment standard of less than 20/30 was difficult to obtain. In recent times it has become feasible to reduce treatment standards below this level. In the modern context, a 1:8 dilution factor may not be the limiting design criterion. At locations where the 1:8 factor will not be met (Mogeely, Castlemartyr and Ballymacoda River), these discharges may be permitted where stricter treatment standards are applied.

27. WASTE ASSIMILATIVE CAPACITY & BOD

27.1 The waste assimilative capacity (WAC) of a watercourse is the mass of BOD which the watercourse can healthily absorb in one day. The WAC is a function of the existing BOD in the watercourse, the maximum permissible BOD and the minimum flow rate. The WAC may be determined as follows:

$$WAC = (C_{max} - C_{back}) \times 95\% \text{ flow}$$

where:

C_{max} = maximum permissible BOD

C_{back} = background upstream BOD

95% flow = 95th percentile flow rate at discharge location

27.2 A number of different quality criteria may be applied in the assessment of impacts on waste assimilative capacity. The strictest criterion is presented in Department of the Environment *Memorandum No. 1: Water Quality Guidelines* (1978) which specifies that the maximum BOD concentration in salmonid freshwaters and estuarine waters should not exceed 4 mg/l. While the Womanagh catchment has not been designated as salmonid, this stricter limit is applied below. The 4 mg/l criterion is also supported by the Royal Commission report of 1912 which noted that river waters with a BOD of 4 mg/l will be ordinarily free from signs of pollution.

27.3 Table 27.1 presents the proposed discharges in the context of waste assimilative capacities available at the four inland settlements. Background BOD concentrations are taken from table 11.1.

27.4 Memorandum No. 1 notes that a discharge to a watercourse should not increase the BOD within the watercourse by more than 1 mg/l, regardless of the background BOD concentration within the river. The maximum BOD loads which may be discharged without breaching this criterion are presented in table 27.2.

Table 27.1 Waste assimilative capacities at four inland WWTPs.

Location	WAC available kg/day
Mogeely	5.7
Castlemartyr	6.3
Ladysbridge	9.4
Killeagh	8.4

Table 27.2 Maximum BOD loads without increasing by more than 1 mg/l downstream.

Location	Capacity proposed	Maximum BOD in discharge mg/l	BOD load kg/day	WAC available kg/day
Mogeely	500	34.6	3.1	5.7
Castlemartyr	3000	8.8	4.8	6.3
Ladysbridge	1000	29.2	5.3	9.4
Killeagh	2000	14.7	5.3	8.4

27.5 The BOD treatment standards required at the four inland WWTPs are indicated in the shaded column in table 27.2. From the table it is apparent that the proposed discharges at Mogeely and Ladysbridge will not result in downstream increases of more than 1 mg/l, even where treated to relatively lenient standards of 34 and 29 mg/l respectively. Conversely, treatment to a typical 20 mg/l standard will readily comply with this criterion. The table indicates that stricter treatment standards will be necessary at Castlemartyr and Killeagh in order to meet the criterion. The standard required at the former will be particularly onerous if a downstream increase of greater than 1 mg/l is to be avoided.

27.6 Where the BOD concentrations in the treated wastewater streams will comply with the maximum limits presented in table 27.2, the daily BOD loads discharged will in all cases be less than the WAC available, ranging from 54% to 76% of the available capacities. It should be noted that these calculations are based on background BOD concentrations of 2 mg/l; concentrations are likely to be generally lower, thus providing greater assimilative capacities than indicated above. It should also be noted that the WAC specified for any watercourse is only indicative of the greatest extent to which the oxygen level in that watercourse may be theoretically depleted by the decomposition of organic matter present. In reality, factors such as low temperatures, aeration at turbulent riffles and other variables may prevent significant deoxygenating from occurring.

27.7 With respect to Ballymacoda, it was determined in 2002 that the WAC available in the local stretch of the Womanagh River was a significantly large 38 kg/day. It was noted that the concentration of BOD in a treated wastewater stream discharged to the Womanagh will not be a limiting factor, and a typical limit of 20 mg/l was recommended. This conclusion still applies.

27.8 With a background BOD concentration of 1 mg/l in the Ballymacoda River as determined in 2002, the maximum BOD concentration in the proposed discharge from 1000 pe is required to be 5.3 mg/l in order to meet the 1 mg/l increase specified in Memorandum No. 1. Such a treatment standard is onerous. However, this level of treatment would result in a daily BOD discharge of 0.95 kg, well within the 1.8 kg/day WAC capacity estimated previously.

28. SUSPENDED SOLIDS

28.1 Of the various standards and articles of legislation discussed in part 2, the strictest suspended solids limits are specified in the Freshwater Fish Directive which notes that a guide limit of 25 mg/l of suspended solids is desirable in fresh waters. The same maximum concentration is specified by the Salmonid Waters Regulations. The application of this limit will ensure compliance with those specified in the Urban Waste Water Directive and in Memorandum No. 1.

28.2 The maximum concentration of suspended solids generally permitted in a treated wastewater discharge is 30 mg/l. Table 28.1 presents the resulting levels of suspended solids which will arise downstream of the five discharges proposed where a 30 mg/l is applied. Background suspended solids levels at the four inland sites are taken from table 11.1. Background concentrations at Ballymacoda are drawn from DixonBrosnan report 02001.

Table 28.1 Suspended solids concentrations downstream of 30 mg/l discharges.

Location	River	Capacity proposed	Background SS mg/l	Downstream SS mg/l
Mogeely	Kiltha	500	5	5.8
Castlemartyr	Kiltha	3000	5	8.7
Ladysbridge	Womanagh	1000	13	13.6
Killeagh	Dissour	2000	5	7.0
Ballymacoda	Womanagh	1000	20	20.1
Ballymacoda	Ballymacoda	1000	5	10.8

28.3 The calculations presented in table 28.1 indicate that downstream suspended solids concentrations will not be significantly increased at most locations where a treatment standard of 30 mg/l is applied. The greatest increase will arise at Ballymacoda River where a limited dilution capacity prevails. Regardless of this increase, downstream levels at all sites will remain below the 25 mg/l limit specified in the Freshwater Fish Directive and Salmonid Waters Regulations. It follows that suspended solids discharge will not be a limiting factor at any of the study sites.

29. NITROGEN

29.1 Elemental nitrogen may be present in a number of forms in a wastewater discharge. Ammonia and nitrates are of most significance, with the relative proportions of their take up by plants and algae varying with their ratio, the local conditions and the species involved. The nitrite form is an intermediate stage in the conversion of these two parameters.

29.2 Of greatest importance is that any proposed discharge does not elevate nitrate levels in the receiving watercourse significantly and does not affect the status of the aquatic environment with respect to the 11.3 mg/l N limit specified in the Nitrates Directive and the Surface Water Directive. It is noted that a figure of 11.3 mg/l N is a maximum value, and allowing levels of nitrate to rise close to this level is not recommended. A guide value equal to 50% of the mandatory value is considered an appropriate target, equivalent to 5.65 mg/l N.

29.3 Nitrogen present as nitrate will rarely impact directly on fish life and thus there are no limits specified in the Freshwater Fish Directive or Salmonid Regulations. Nitrite limits are specified under Quality of Salmonid Waters Regulations. Of more significance are levels of ammonia, particularly the un-ionised form. The European Inland Fisheries Advisory Commission (1970) have reported that an un-ionised concentration of 0.02 mg/l NH_3 will present a long term sublethal dose for salmonid and cyprinid fish. This level of 0.02 mg/l is specified under the Salmonid Regulations. The same regulations have specified a maximum total ammonium concentration of 1 mg/l N.

29.4 Most modern packaged treatment units produce a nitrified effluent, with the major portion of nitrogen converted from ammonia to nitrates as a result of nitrification processes incorporated in the design. Due to the conversion dynamics within secondary stage treatment units, it is difficult to specify separate concentrations of ammonia and nitrates to be met in the treated effluent. The application of a total nitrogen limit, consisting of ammonia, nitrates and intermediate stages, provides a more common sense approach and limits below are specified accordingly.

29.5 Without the installation of specific nitrogen removal processes, secondary stage treatment units will not significantly reduce nitrogen levels but merely convert the various forms present to oxidised nitrate with consequent reductions in ammonia concentrations. The total nitrogen concentration in the treated wastewater stream is likely to be similar to the influent concentration of approximately 40 mg/l (taken from table 24.2). The modular design of packaged systems allows further nitrification to be introduced following commissioning. It is unlikely that a modern WWTP providing secondary stage treatment will result in problematic levels of ammonia. Nonetheless, it is recommended that the 1 mg/l N limit noted above is applied as a guide quality standard downstream of the mixing zone.

29.6 With a total nitrogen concentration of 40 mg/l in the treated wastewater stream, the resulting downstream nitrate concentrations in the various watercourses may be determined. These concentrations are presented in table 29.1. For the purposes of the calculations, it is assumed that almost all of the nitrogen present in the discharges will be present as nitrate. The calculated concentrations do not change significantly where other assumptions are applied eg. that 80 or 90% of the nitrogen is present as nitrate. Background concentrations are taken from tables 9.4 and 11.1

Table 29.1 Total nitrogen concentrations downstream of 40 mg/l discharges.

Location	River	Capacity proposed	Background NO ₃ mg/l N	Background NO ₃ D/S of commercial discharge mg/l N	Downstream NO ₃ mg/l N
Mogeely	Kiltha	500	6.09	7.25*	8.27
Castlemartyr	Kiltha	3000	6.23	-	11.19
Ladysbridge	Womanagh	1000	6.23	-	7.47
Killeagh	Dissour	2000	4.34	-	7.15
Ballymacoda	Womanagh	1000	4.30	-	4.83
Ballymacoda	Ballymacoda	1000	2.30	-	11.04

*See 29.8

29.7 At all discharges, excluding that to the Womanagh River from Ballymacoda, the nitrate concentration downstream of the mixing zone will exceed the 5.65 mg/l guide value noted in 29.2. The concentration at Castlemartyr will be particularly unsatisfactory. The concentration in the Ballymacoda River will also be unsatisfactory if this option is applied at Ballymacoda. It is likely that removal of nitrogen will be required at all sites, except where the Ballymacoda discharge is piped to the Womanagh River.

29.8 It is noted that there is a significant discharge of 650 m³/day from Dairygold with a licensed total nitrogen limit of 12 mg/l N. If it is assumed that this nitrogen exists as nitrate, calculations indicate that the discharge increases downstream nitrate levels from 6.09 mg/l N to 7.25 mg/l N during the March-September discharge period. The discharge of nitrogen from 500 pe will further increase downstream levels to 8.27 mg/l N.

29.9 As noted in 29.5, the majority of nitrogen in the treated wastewater stream will be present as oxidised nitrate. Calculations presented in table 29.2 indicate that, where 90% of the nitrogen is oxidised, the residual 4 mg/l of ammonia in the treated discharge will result in downstream concentrations generally below the 1 mg/l limit noted in 29.3. Concentrations will be significantly increased over background levels, however, providing further incentive to install nitrogen removal processes at the study sites.

Table 29.2 Ammonia concentrations downstream of 4 mg/l discharges.

Location	River	Capacity proposed	Background NH ₄ mg/l N	Background NH ₄ D/S of commercial discharge mg/l N	Downstream NH ₄ mg/l N
Mogeely	Kiltha	500	0.021	0.110	0.229
Castlemartyr	Kiltha	3000	0.026	-	0.610
Ladysbridge	Womanagh	1000	0.026	-	0.172
Killeagh	Dissour	2000	0.021	-	0.335
Ballymacoda	Womanagh	1000	0.15	-	0.210
Ballymacoda	Ballymacoda	1000	0.08	-	0.990

30. PHOSPHORUS

30.1 Within the aquatic environment phosphorus will be present in a number of forms, both organic and inorganic, and within solution or bound in solids. The combination of all forms present is referred to as total phosphorus. A significant fraction of total phosphorus is available for biological metabolism and is termed orthophosphate. The analytical procedure used in the determination of orthophosphate is the molybdate reactive method which is used to derive the concentration of molybdate reactive phosphate (MRP) in a sample. Although the MRP may slightly overestimate the level of orthophosphate present the two expressions have become synonymous.

30.2 Despite the important role of phosphorus and orthophosphate in eutrophication, few water quality standards specify guideline or maximum allowable concentration values. The introduction of the Phosphorus Regulations in 1998 changed this situation, and the Regulations have now become the most significant quality criteria in assessing discharges to waters. Target values specified in the Regulations are indicated in table 17.1.

30.3 On the basis of site surveys undertaken during the preparation of this report, and following a review of EPA monitoring data, existing Q values at the four inland sites were ascertained. From these values, the equivalent background MRP concentrations were determined. These figures are summarised in table 11.1. At three of the four sites Q4 values were awarded, corresponding to an orthophosphate level of 0.03 mg/l P. The situation at Castlemartyr is more complex, and a Q3-4 value and background orthophosphate level of 0.05 mg/l P was measured.

30.4 Modern treatment plants can lower the discharge concentration of total phosphorus to 2 mg/l P. 1 mg/l is technically difficult to achieve. The concentration of orthophosphate present will usually be approximately 80% of the total phosphorus, equivalent to 1.6 mg/l and 0.8 mg/l P respectively.

30.5 Table 30.1 presents the likely downstream concentrations of MRP arising from the discharges proposed at the four inland WWTPs. The table indicates that the discharges will result in significant increases in the receiving waters. In this context, treatment to a 1 mg/l total phosphorus standard will be required as a minimum at the four inland plants.

Table 30.1 MRP concentrations downstream of four inland WWTPs.

Location	Capacity proposed	Background MRP mg/l P	Downstream MRP where effluent MRP = 1.6 mg/l P	Downstream MRP where effluent MRP = 0.8 mg/l P
Mogeely	500	0.03	0.078	0.054
Castlemartyr	3000	0.05	0.261	0.143
Ladysbridge	1000	0.03	0.088	0.058
Killeagh	2000	0.03	0.154	0.091

30.6 The proximity of Mogeely and Castlemartyr requires that cumulative impacts are considered. The most significant discharge at Mogeely arises from the Dairygold facility, equivalent to 3610 pe at an estimated discharge concentration of 0.6 mg/l P orthophosphate. Applied to an estimated upstream orthophosphate concentration of 0.03 mg/l, the Dairygold discharge increases the concentration to 0.136 mg/l P. The proposed discharge of 500 pe from Mogeely, at a treatment standard of 0.8 mg/l P orthophosphate, will further increase the downstream level to 0.156 mg/l P.

30.7 Based on these calculations, the background orthophosphate concentration upstream of Castlemartyr will be 0.156 mg/l P. However, the Dairygold discharge arises only during the period March-September. It is not clear what proportion of the discharged phosphate becomes bound up in sediments and aquatic plants in the stretch of river between Mogeely and Castlemartyr, resulting in year-round release of orthophosphate. A reasonable approach is to assume that the higher value of 0.05 mg/l orthophosphate, presented in table 11.1 as the background orthophosphate concentration at Castlemartyr, already factors in the discharges from Mogeely.

30.8 At Ballymacoda, it was concluded in 2002 that the discharge of a treated wastewater stream containing 2 mg/l of total phosphorus directly to the Womanagh River will not result in a significant increase in the downstream concentration. With a significantly large dilution available, calculations indicate that downstream concentrations of MRP are likely to rise by less than 0.02 mg/l as a result of the proposed discharge, a relatively low increase in an estuarine environment. It follows that a 2 mg/l treatment standard may be applied in this case.

30.9 Due to the limited dilution available in the Ballymacoda River, the discharge of 2 mg/l total phosphorus from 1000 pe will increase the background MRP concentration by 0.36 mg/l to 0.42 mg/l. Treatment to a 1 mg/l standard will result in an increase of 0.17 mg/l. These increases are significantly high. Following the assessment of this discharge possibility in 2002, it was concluded that such a discharge should be allowed only where a constructed wetland system is installed and an intensive monitoring routine put in place.

31. PATHOGENS

31.1 Table 24.2 indicates that domestic wastewater will contain on average 100 million and 40 million colony forming units of total and faecal coliforms respectively per 100 ml. These organisms, while not overtly pathogenic in themselves, are used as indicators of pathogenic activity. Due to growth and decay dynamics within bacterial populations, normal mass balance calculations cannot be applied in the assessment of bacteriological impacts. Significant variations in local environmental conditions and wastewater microbiological characteristics do not facilitate the generation of discharge-specific models.

31.2 All treatment processes applied to wastewater will provide some degree of coliform reduction, usually via the filtration of suspended solids in the wastewater stream. Gray (1999) reports that conventional treatment will remove up to 90% of bacterial pathogens, with tertiary treatment increasing this to 98%. Further reduction to 99.99% may be achieved using disinfection. He also notes that dilution and the effects of natural biotic and abiotic factors in surface waters will reduce the density of pathogens further.

31.3 In 13.4 and 15.3 it is noted that the microbiological quality of the waters around Youghal Bay are of importance and that the proposed discharges should not interfere with same. However, given the difficulties associated with the modelling of microbiological impacts of a discharge, the varying treatment abilities of treatment plants, and the absence of coliform quality objectives applicable to treated discharges, no specific coliform standards are recommended. It is instead recommended that a monitoring programme is undertaken following the commissioning of each WWTP. An ongoing examination of key microbiological parameters, including total and faecal coliforms, faecal streptococci and sulphite reducing clostridia, may be used to determine the overall treatment efficiency of each plant.

31.4 It is also recommended that the design of each WWTP be such that the post installation of disinfection equipment is facilitated. This recommendation applies particularly to the proposed discharge at Ballymacoda.

32. WWTP SUMMARIES

32.1 Mogeely

32.1.1 Two discharges to the Kiltha River currently arise at Mogeely: a municipal discharge from 100 pe and a licensed discharge from Dairygold. Both are treated in WWTPs. The outfalls are located in close proximity to each other, and their impacts on the watercourse are therefore cumulative. Cork County Council proposes to increase

the capacity of the municipal WWTP to 500 pe Site investigations indicate that there is little or no visual evidence of significant impacts on the Kiltha River specifically arising from the current discharge of 100 pe

32.1.2 The discharge from Dairygold's facility at Mogeely is significantly greater than from the municipal WWTP. The discharge of approximately 650 m³/day, equating to over 3600 pe, contains a treated MRP concentration of approximately 0.6 mg/l P. This discharge, coupled with the proposed increase in the municipal plant capacity to 500 p.e., will result in a combined downstream increase in MRP levels to approximately 0.156 mg/l P. This significantly high concentration will result even where the total phosphorus concentration in the municipal discharge is treated to 1 mg/l P.

32.1.3 The utilisation of most of the WAC available at this location leaves little spare capacity for significant increases in the municipal plant. Treatment of BOD to a 10 mg/l standard will result in a daily BOD load of 0.9 kg, bringing the total BOD load at this location to almost 5 kg/day, 88% of the total available. It is generally advisable to maintain a reserve assimilative capacity of at least 30% to allow effective management of natural fluctuations in organic load. In this context, treatment towards a 5 mg/l target is advisable. No restrictions apply to the suspended solids concentration in the treated municipal discharge, and conventional treatment standards of 30 mg/l will suffice here. Nitrogen removal will be required in the plant.

32.2 Castlemartyr

32.2.1 The EPA monitoring station at Castlemartyr Bridge has consistently exhibited unsatisfactory water quality since 1997. The EPA notes that the Dairygold discharge at Mogeely is the likely cause. The EPA also notes that the existing discharge from the WWTP at Castlemartyr is negatively affecting water quality downstream at Ballyhonock.

32.2.2 Cork County Council proposes to increase the capacity of the WWTP, the largest in the catchment, from 1500 to 3000 pe Flow data indicate that this increase will result in a dilution factor of less than 1:6. Compliance with the traditional 1:8 standard would limit the WWTP capacity to approximately 2200 pe The limited dilution available also has implications for BOD: a treatment standard of 10 mg/l will result in a downstream increase of greater than 1 mg/l (1.2 mg/l), and will utilise 85% of the available WAC. It is advisable that a stricter BOD limit is applied to the treated discharge, and BOD performance should be made an important criterion when comparing WWTP tenders.

32.2.3 Due to the elevated nitrate concentrations detected in this stretch of the Kiltha River, and the limited dilution available, nitrogen removal will be required. The total phosphorus concentration will need to be reduced to 1 mg/l as a minimum in the treated discharge.

32.2.4 Monitoring data supplied by Response Engineering Ltd. who operate the existing WWTP at Castlemartyr indicate that total phosphorus concentrations in the discharge averaged 5.54 mg/l P in 2005, with a median of 4.07

mg/l P. The average daily discharge of phosphorus is estimated at 1.5 kg/day P. Despite this load, a Q value of Q4 was assigned 50 m downstream of the WWTP outfall during the preparation of this report, suggesting that the current discharge may be having a limited and/or local impact only. With treatment to a standard of 1 mg/l of total phosphorus, the proposed discharge from 3000 pe will result in a significantly smaller load of 0.54 kg/day P. This estimate is of course based entirely on satisfactory compliance with the 1 mg/l P standard.

32.2.5 It is noted that the proposed increase to a population equivalent of 3000 has the potential to negatively impact on the watercourse. It is recommended therefore that the impact be reassessed on an ongoing basis through EPA Q values and Cork County Council water quality data where relevant. It is also recommended that site specific biological and physicochemical surveys are undertaken downstream of the discharge. It is recommended that this assessment be carried out prior to the population equivalent reaching 2200 pe

32.3 Ladysbridge

32.3.1 While EPA monitoring data suggest eutrophication in the middle stretch of the Womanagh River, which includes Ladysbridge, investigations undertaken by DixonBrosnan indicate fair-good water quality immediately upstream of Ladysbridge. These investigations also suggest that the existing WWTP discharge is impacting significantly on water quality.

32.3.2 It is proposed to install a new WWTP to cater for up to 1000 pe. The existing poor quality discharge will be eliminated. Ample dilution is available to accept the increased wastewater volume, and the available waste assimilative capacity is entirely sufficient. Treatment to a conventional BOD/suspended solids standard of 20/30 mg/l will be adequate. In the interest of improving water quality in the middle and lower reaches of the Womanagh catchment, treatment to a 10/15 mg/l standard is preferable, particularly in light of elevated suspended solids concentrations seen during site surveys.

32.3.3 As before, the installation of a nitrogen removal process will be required to maintain the downstream nitrate level below the 5.65 mg/l N limit noted in 30.2. Phosphorus treatment to a 1 mg/l P standard is also advisable.

32.3.4 It is noted that the current wastewater discharge at Ladysbridge approaches 500 pe which is directed to the Womanagh River via an overloaded septic tank. The main function of a septic tank is to act as a primary settlement tank, removing some of the BOD and the majority of the suspended solids. The EPA document *Wastewater treatment manuals: Primary, secondary and tertiary treatment* (1997) estimates that typically 50-70% of suspended solids are removed in primary settlement tanks; BOD is reduced by 20-50% and the bacterial count by 25-75%. In this instance, due to overloading of the septic tank, the level of treatment provided is likely to be very low.

32.3.5 Table 24.2 indicates that the mean orthophosphate concentration in a typical influent stream is 7.1 mg/l, equating to approximately 8.9 mg/l of total phosphorus. If it is conservatively assumed that the septic tank at

Ladysbridge reduces the total phosphorus concentration to 5 mg/l, the daily load discharged to the river from the 500 pe served may be estimated at 0.45 kg P. Following the proposed upgrade, the discharge of treated wastewater from 1000 pe containing 1 mg/l of total phosphorus, as recommended in 32.3.3, will result in a discharge load of 0.18 kg/day P. It follows that, with a 1 mg/l P treatment standard, the proposed WWTP upgrade will significantly reduce the daily total phosphorus load discharged to the Womanagh River at this location.

32.4 Killeagh

32.4.1 Monitoring data recorded by the EPA, Cork County Council and DixonBrosnan during the preparation of this report indicate satisfactory water quality at Killeagh. Nitrate and median MRP concentrations have generally been lower here than at the other sites, due most likely to limited development and discharges in the upstream Dissour River and at Killeagh village.

32.4.2 Cork County Council proposes to increase the capacity of the WWTP at Killeagh from 850 to 2000 pe. The available dilution will exceed the traditional 1:8 standard. At 1:11.7, however, the dilution will not be great enough to preclude the need for nitrogen removal.

32.4.3 The available WAC to accept the proposed increase is adequate. No BOD or suspended solids restrictions will apply, and thus a 20/30 mg/l standard will suffice. As before, a treated phosphorus concentration of 1 mg/l will be necessary to minimise downstream increases in the Dissour River.

32.4.4 2005 monitoring data provided by Response Engineering Ltd. indicate a mean total phosphorus concentration of 2.63 mg/l P in the treated effluent. The daily phosphorus load discharged to the Dissour River at this location is estimated at 0.40 kg P. If a final treatment standard of 1 mg/l total phosphorus is successfully applied at the upgraded plant, the total load discharged from 2000 pe will be 0.36 kg/day P, representing a reduction of 10% in the current load discharged. It is also noted that, although the existing discharge at Killeagh may be having a localised impact, it appears that the ecology of the river recovers relatively quickly. There may be limited impacts further downstream.

32.5 Ballymacoda

32.5.1 Following an assessment of local conditions at Ballymacoda in 2002, two discharge options were presented. Both options were reassessed in light of the increased treatment capacity to 1000 pe now proposed. The less practical of these, disposal to the Womanagh River via a direct main of approximately 1000 m in length, will allow ready compliance with all relevant water quality criteria due to the considerable dilution available. A BOD/suspended solids standard of 20/30 mg/l and a total phosphorus concentration of 2 mg/l in the treated effluent will suffice. Nitrogen removal will not be required, although its inclusion is preferable in a discharge to an estuarine environment, particularly as nitrate levels remain elevated in the Womanagh system.

32.5.2 While water quality criteria favour direct disposal to the Womanagh, engineering constraints favour the alternative: disposal to the Ballymacoda River. With a severely restricted dilution of less than 1:4, it is unlikely that most water quality criteria will be met in the river. The BOD concentration will need to be reduced towards 5 mg/l to allow direct compliance with Memorandum No. 1. Nitrogen and phosphorus removal will also be required. It was concluded in the DixonBrosnan report 02001 that, despite these limitations, disposal to the Ballymacoda River represents a practical alternative. The reasons put forward in 2002 still apply with the increased load currently proposed, and they are reproduced below:

A. The river lies relatively close to the WWTP site, with no difficult features to be crossed in the intervening terrain such as roads or rivers.

B. The management of river flow by a sluice limits tidal input, thereby reducing the possibility of backwashing up the river. The sluice control also provides an effective flushing system.

C. A survey of the river indicates that it has suffered limited damage from the imperfect discharge which it has been receiving for some years. The river would appear to have a significant capacity to accept and assimilate wastewater.

D. The ecology of the river, particularly in sluggish areas with extensive macrophyte development, is quite similar to that seen in constructed wetlands. The river may provide an ideal natural environment to assimilate a polished wastewater.

E. While the ecology of the river may be ideal, it is not of biological significance. No rare or unusual species were noted during site surveys, and the river is not of fisheries importance.

F. The available dilution was determined using the estimated 95th percentile flow. The normal flow is likely to significantly exceed this level; the EPA notes that the average flows in Irish rivers correspond to the 30th percentile flow.

G. Approximately 900 m downstream of the likely outfall location, the available dilution increases 20-fold where the Ballymacoda River meets the Womanagh. Accordingly the river stretch subject to any immediate impacts will be limited.

32.5.3 It is considered that disposal to the Ballymacoda River remains a practical option if water quality criteria can be relaxed over its short stretch to the Womanagh. Innovative engineering solutions may be required to incorporate the river into a satisfactory wastewater treatment proposal. It is recommended that any solutions proposed include the installation of a constructed wetland to provide flow balancing and additional reduction in BOD, nitrogen, phosphorus and pathogen concentrations.

33. LOADINGS IN WOMANAGH CATCHMENT

33.1 The calculations detailed in this report have generally focused on the individual settlements rather than the catchment as a whole. Of the various discharge parameters, phosphorus is the most limiting factor and is also the most difficult to remove using modern wastewater treatment plants. This sections therefore focuses on this parameter although it may be relevant for other parameters.

33.2 The impacts of phosphorus will vary and how it effects a given watercourse will be affected by elements such as shade levels, plant growth, current and disturbance of the channel. There may also be impacts considerable distances away from the discharge point and cumulative impacts from different discharge points. Thus there is merit in considering impacts on an overall catchment basis.

33.3 Although exact measurements are outside the scope of this report, investigations across the study site suggest that the main sources of phosphorus are as follows:

- A. Agricultural sources.
- B. One off dwellings and septic tanks.
- C. Commercial discharges.
- D. Discharges from wastewater treatment plants.

33.4 It would appear that there are no significant commercial or residential discharges upstream of Mogeely, and therefore phosphorus loadings upstream of the village are generally derived from agricultural sources and/or from one off dwellings. These loadings may be extrapolated to determine agricultural and residential derived inputs from the overall catchment.

33.5 The median MRP concentration determined for the only monitoring site upstream of Mogeely (station 0700) was 0.034 mg/l (from table 7.1). Data provided by Met Eireann indicate that the long term (1961-1990) average rainfall is 1000-12000mm per annum. The average applied across the country by the EPA hydrometric office is 1150mm. The average runoff within a catchment is the total rainfall less evapotranspiration losses and, where the groundwater resource is small, can be defined as the average river flow. The average evapotranspiration loss in Ireland is estimated at 450 mm, and thus the average total runoff is estimated at some 700 mm per year. Based on these figures the EPA hydrometric office calculates the average run off in the southern region at 27 l/s/km².

33.6 The catchment area contributing to flows at monitoring station 0700 is estimated at 20.4 km². The average flow is calculated at 551 l/s. With a median MRP concentration 0.034 mg/l, the daily orthophosphate loading at this point is estimated at 1.6 kg/day orthophosphate, equivalent to 580 kg/year. The unit orthophosphate load is calculated at 0.08 kg/km²/day, or 29 kg/km²/year.

33.7 Although the intensity of agricultural management and number of one off dwellings will vary, it is assumed for the purposes of this report that the subcatchment upstream of Mogeely is similar to the remainder of the catchment. With a total surface area of 165 km², the total orthophosphate loading within the entire Womanagh catchment attributable to agriculture and one off dwellings is calculated at 13.2 kg/day or 4820 kg/year.

33.8 The only large scale discharge noted in the catchment arises from Dairygold at Mogeely. The orthophosphate loading from this site was estimated in 3.2.10 at 0.39 kg/day, totalling 83 kg over the operations period.

33.9 Estimated orthophosphate loadings from the existing WWTP sites are detailed in table 33.1. Table 33.2 indicates the proposed upgrade loadings. A comparison between the tables indicates that incorporation of the recommended treatment standards into the proposed upgrades will result reduce current orthophosphate loadings from the WWTPs by almost half.

Table 33.1 Estimated orthophosphate loadings from existing WWTPs.

WWTP	Current pe	Orthophosphate discharged mg/l	Orthophosphate discharged kg/day	Orthophosphate discharged kg/year
Mogeely	100	2.0 ¹	0.04	15
Castlemartyr	1500	4.4 ²	1.19	434
Ladysbridge	500	4.0 ³	0.36	131
Killeagh	850	2.1 ⁴	0.32	117
Ballymacoda	500	4.0 ³	0.36	131
Total			2.27	828

¹Assumed conservative treatment standard of 2 mg/l.

²From mean total phosphorus value of 5.54 mg/l derived from sample results. Assumed 80% orthophosphate ie. 4.4 mg/l.

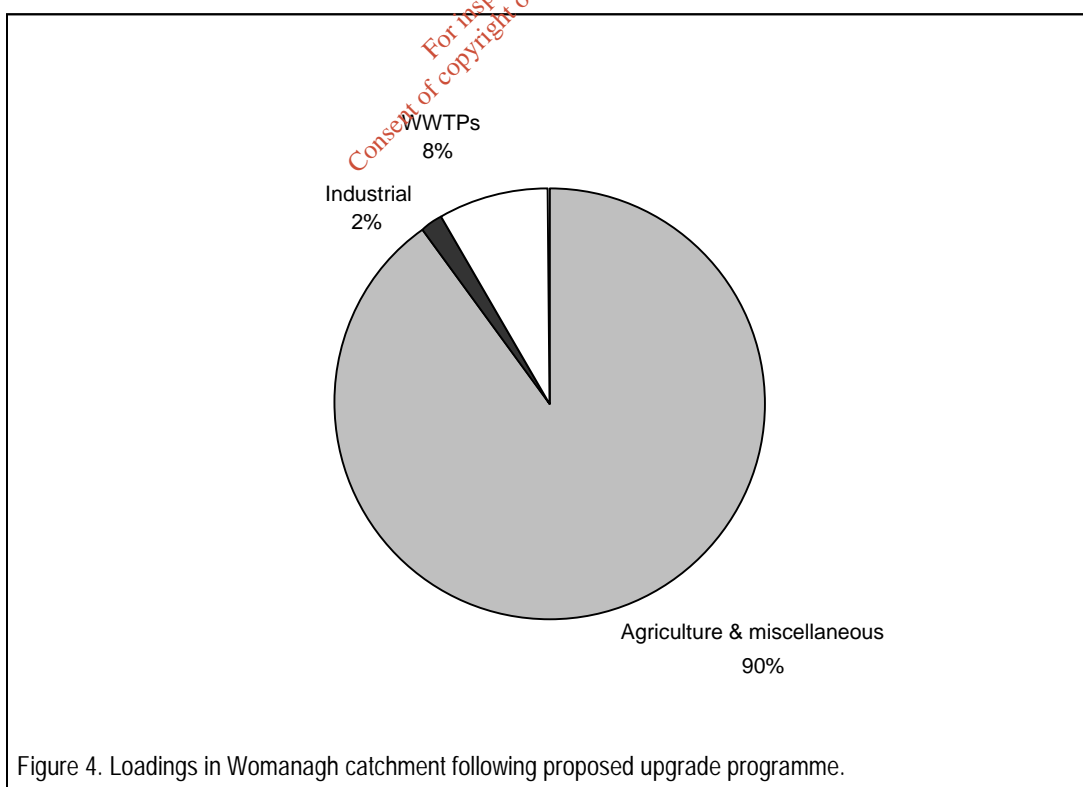
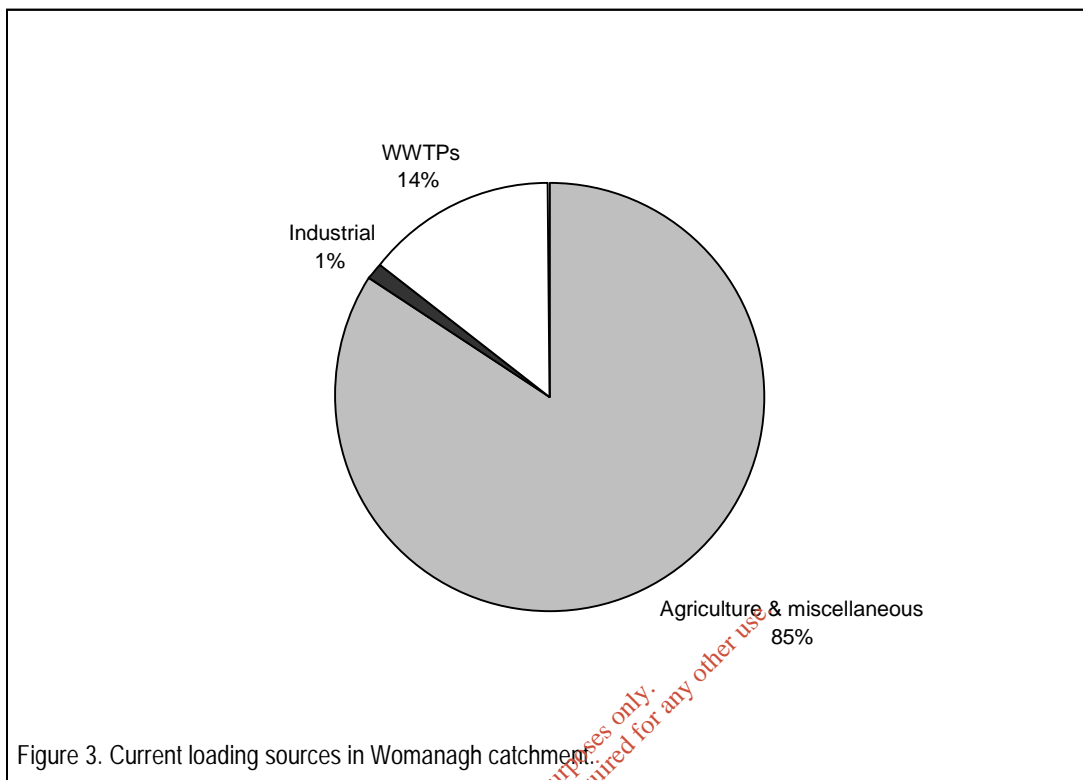
³Mean orthophosphate concentration in typical influent stream is 7.1 mg/l (table 24.2). Assumed this is reduced to 4 mg/l orthophosphate by septic tank.

⁴Phosphorus concentration in discharge is calculated at 2.63 mg/l. Assumed 80% orthophosphate ie. 2.1 mg/l.

Table 33.2 Estimated orthophosphate loadings from upgraded WWTPs.

WWTP	Proposed pe	Proposed orthophosphate treatment mg/l	Orthophosphate discharged kg/day	Orthophosphate discharged kg/year
Mogeely	500	0.8 (1 total P)	0.07	26
Castlemartyr	3000	0.8 (1 total P)	0.43	157
Ladysbridge	1000	0.8 (1 total P)	0.14	51
Killeagh	2000	0.8 (1 total P)	0.29	106
Ballymacoda	1000	1.6 (2 total P)	0.29	106
Total			1.22	446

33.10 Figures 3 and 4 present a comparison between all loadings arising from within the Womanagh catchment. Figure 3 shows the current situation, while figure 4 represents loadings following the proposed upgrade programme.



33.11 The figures above indicate the predominance of agricultural and miscellaneous sources such as one of houses. Most orthophosphate discharging to the Womanagh is derived from these sources. The proportion of orthophosphate reaching the river from the wastewater treatment plants is relatively low. This proportion will decrease by approximately 50% following their upgrade. It will decrease further following upgrades of the treatment plants. In this context, changes in agricultural management, and correct management of septic tanks associated with houses, has the potential to significantly reduce inputs of orthophosphate reaching the aquatic environment. Given the difficulties associated with orthophosphate reduction at WWTPs, where high costs are required to obtain marginal improvements in treatment efficiencies, the practical advantages of focussing on extensive sources across the catchment cannot be ignored.

33.12 It should be noted that, although calculations indicate that orthophosphate loadings from the WWTPs will be reduced, there is significant pressure on the available assimilative capacity within the catchment.

34. OTHER CONSIDERATIONS

34.1 As nitrification processes may interfere with the wastewater pH, it is recommended that the effluent discharges from all WWTPs are monitored to ensure the pH does not fall outside the range 6-9 where such processes are employed.

34.2 It is recommended that any existing discharges be removed following commissioning of upgraded plants. It is also advisable that an assessment be carried out of all premises to ensure that grey water entry to the surface water system is limited.

34.3 It is recommended that grit traps, grease traps and interceptors as appropriate are stipulated in planning permissions granted to any commercial developments intending to discharge to the Womanagh.

34.4 In the final selection of WWTP units it is recommended that the following criteria be applied by each supplier at the design stage:

- A. WWTPs should be designed, constructed, operated and maintained to ensure sufficient performance under all normal local climatic conditions.
- B. Seasonal variations of the load should be taken into account, particularly at Ballymacoda.
- C. Provision should be made for possible future retrofitting of additional nitrogen removal and disinfection processes.
- D. Sampling points should be provided on the influent and effluent lines to each WWTP unit.

34.5 The EPA's noise guidance note states that the noise level at a sensitive location should not exceed 55 dB during daytime hours and 45 dB at night-time. As the proposed WWTPs will be operative during both periods, it is recommended that the 45 dB limit is applied. In order to meet this limit, and also to prevent odour nuisance, it is recommended that a buffer zone of at least 50 m is allowed between the site of the each WWTP and the nearest existing development, of which 30 m or more should lie within the WWTP site boundary.

34.6 Modern treatment plants if correctly maintained should not cause excessive odours and similarly noise pollution is unlikely to be a significant issue. However it is important that both noise and odour are assessed on an ongoing basis. The treatment plants to be used should allow retrospective fitting of control systems should odour become a problem in the future.

34.7 It is advisable that a maintenance contract is agreed with each WWTP supplier.

34.8 It is recommended that any proposed upgrades to new or existing WWTPs or any increases in loadings to the plants are accompanied by a reassessment of waste assimilative capacities in the local catchment.

34.9 The construction phases of each WWTP upgrade should be carried out in a manner which does not interfere with adjacent watercourses in any way. Untreated discharges during the construction phase and during commissioning should not be permitted.

34.10 At all plants, and particularly at Ballymacoda, it is recommended that a pathogen monitoring programme is undertaken following the commissioning of the WWTP selected. The design and layout of each WWTP should provide for retrofitting of disinfection equipment if deemed necessary.

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APPENDICES

Appendix 1: Surface water discharges in Womanagh catchment.

Appendix 2: Desktop flow assessment.

Appendix 3: Site synopses.

Appendix 4: Extract from Cork County Council Phosphorus Regulations Implementation Report 2004.

Appendix 5: Biological survey species list.

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SITE SYNOPSIS

SITE NAME: BALLYMACODA (CLONPRIEST AND PILLMORE)

SITE CODE: 000077

This coastal site stretches north-east from Ballymacoda to within about 6 km of Youghal, Co. Cork. Though moderate in size, it has a good diversity of coastal habitats, including several listed on Annex I of the E.U. Habitats Directive.

The site comprises the estuary of the Womanagh River, a substantial river which drains a large agricultural catchment. Part of the tidal section of the river is included in the site and on the seaward side the boundary extends to the low tide mark. The inner part of the estuary is well sheltered by a stabilised sandy peninsula (Ring peninsula). Sediment types vary from muds to muddy sands in the inner part to fine rippled sands in the outer exposed part. The macro-invertebrate fauna of the intertidal flats is well-developed, with the following species occurring: *Corophium volutator*, *Hediste diversicolor*, *Arenicola marina*, *Macoma balthica*, *Scrobicularia plana*, *Cerastoderma edule* and *Lanice conchilega*. In the more sheltered areas the intertidal flats are colonised by mats of green algae (mostly *Enteromorpha* spp.), with brown seaweeds occurring on the rocky shores of the shingle spits. Common Cord-grass (*Spartina anglica*) has spread within the estuary since the late 1970s.

The main channel is flanked by salt marshes and wet fields, much of the latter being improved for agriculture. The salt marshes are mainly classified as Atlantic salt meadows, with such species as Sea Purslane (*Halimione portulacoides*), Sea Lavender (*Limonium humile*) and Sea Milkwort (*Glaux maritima*). On the lower levels of the marshes, and extending out onto the open sand and mud flats, occur annual salt marsh species such as Glasswort (*Salicornia* spp.) and Sea Blite (*Suaeda maritima*). The salt marshes at the site are of particular note as they are of the scarce 'lagoon' type. They are also of good quality and parts of them are in active growth.

Part of the site is also a Special Protection Area for birds; the main interest of the area lies in its waterfowl, with flocks of up to 20,000 regularly present during winter (e.g. 1995-96 peak = 19,725). A total of 107 wetland species have been recorded from this site. Maximum figures for the four winters 1994/95-97/98 show that Golden Plover, a species listed under Annex I of the Birds Directive, almost reached internationally important numbers (9,100) and that the Bar-tailed Godwit, another Annex I species, was present in nationally important numbers (494). Eleven other species also occurred in nationally important numbers: Teal (688), Ringed Plover (163), Grey Plover (504), Lapwing (3800), Sanderling (108), Dunlin (3,373), Curlew (1,378), Knot (280), Redshank (300), Black-tailed Godwit (422) and Turnstone (144). Several additional species occur in regionally or locally important numbers.

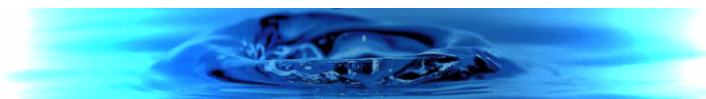
Much of the land adjacent to the estuary has been reclaimed and is subject to intensive agriculture, with cattle grazing and silage being the most common land uses. However, many of these fields remain marshy and are important feeding and roosting

areas for wildfowl, Golden Plover and Lapwing. The most serious threat to the site is water pollution, primarily from slurry spreading.

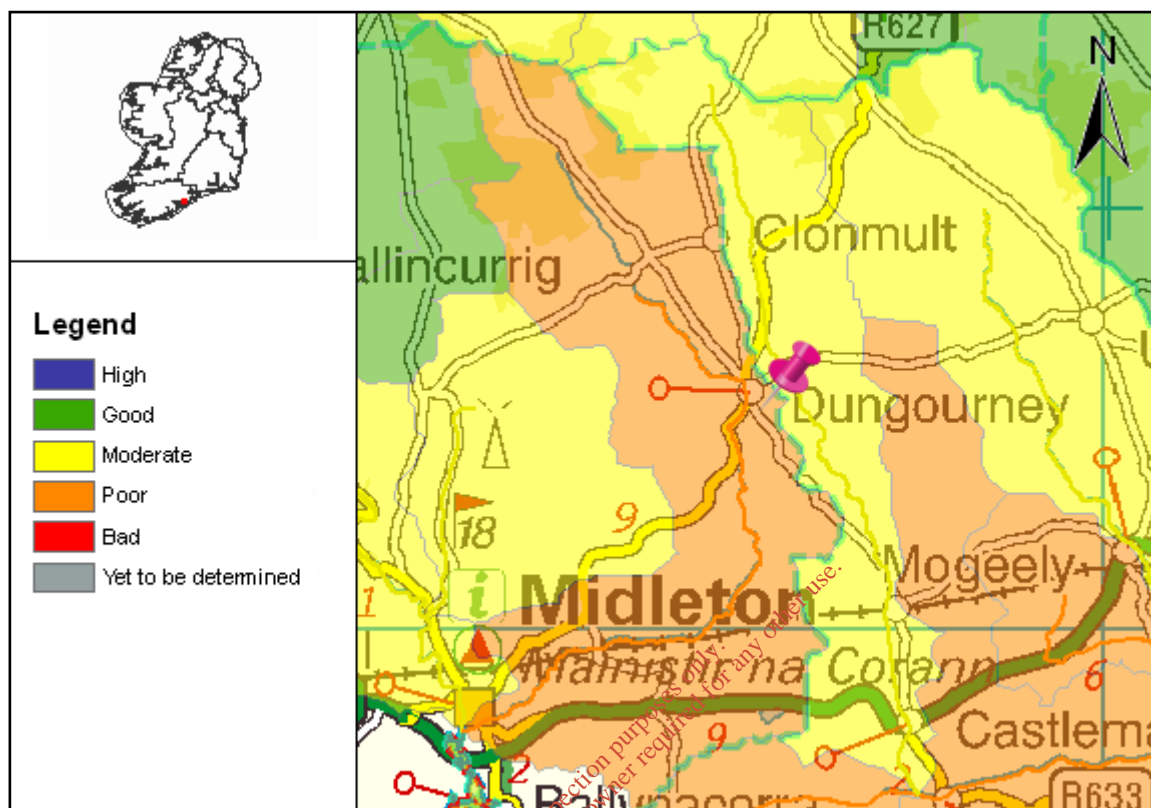
This site's conservation value derives largely from the presence of a number of important coastal habitats listed in Annex I of the E.U. Habitats Directive. But, there is also considerable ornithological interest; Ballymacoda is one of the most important bird sites in the country and supports a higher number of waders than any other Cork estuary of its size. It also contains important numbers of the Golden Plover and Bar-tailed Godwit, two Annex I Bird Directive species, and nationally important numbers of eleven further bird species.

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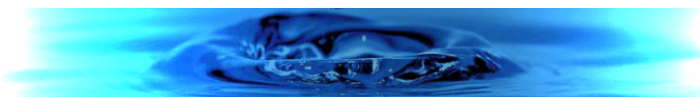


Full Report for Waterbody Kiltha, Trib of Womanagh



Date Reported to Europe: 22/12/2008

Date Report Created 02/06/2009



Summary Information:

WaterBody Category: Subbasin Waterbody

WaterBody Name: Kiltha, Trib of Womanagh

WaterBody Code: IE_SW_19_1909

Overall Status: **Moderate**

Overall Objective: **Restore**

Overall Risk: **1a** At Risk

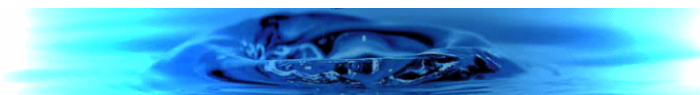
Applicable Supplementary Measures: Unsewered; Urban & Industrial; Morphology; Forestry;
Report data based upon Draft RBMP, 22/12/2008.



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Date Report Created 02/06/2009



Status Report

WaterBody Category: Subbasin Waterbody
 WaterBody Name: Kiltha, Trib of Womanagh
 WaterBody Code: IE_SW_19_1909
 Overall Status Result: **Moderate**

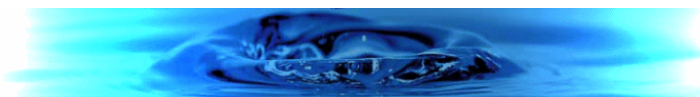


	Status Element Description	Result
EX	Status from Monitored or Extrapolated Waterbody	
	Biological Elements	
Q	Macroinvertebrates (Q-Value)	Moderate
F	Fish	Good
DI	Phytobenthos (Diatoms)	n/a
FPM	Status value as determined by Margartifera	n/a
	Supporting Elements	
MOR	Hydromorphology	n/a
SP	Specific Pollutants	n/a
PC	General Physico-Chemical	n/a
	Chemical Status	
PAS	Chemical Status	n/a
	Overall Ecological Status	
O	Overall Ecological Status	Moderate

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Date Report Created 02/06/2009



Risk Report

WaterBody Category: Subbasin Waterbody
 WaterBody Name: Kilttha, Trib of Womanagh
 WaterBody Code: IE_SW_19_1909
 Overall Risk Result: **1a** At Risk

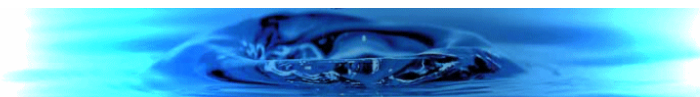


Risk Test Description	Risk
Point Risk Sources	
RP1 WWTPs (2008)	1a At Risk
RP2 CSOs	1b Probably At Risk
RP3 IPPCs (2008)	2b Not At Risk
RP4 Section 4s (2008)	2b Not At Risk
RPO Overall Risk from Point Sources - Worst Case (2008)	1a At Risk
Diffuse Risk Sources	
RD1 EPA diffuse model (2008)	1b Probably At Risk
RD2a Road Wash - Soluble Copper	2b Not At Risk
RD2b Road Wash - Total Zinc	2b Not At Risk
RD2c Road Wash - Total Hydrocarbons	2b Not At Risk
RD3 Railways	2b Not At Risk
RD4a Forestry - Acidification (2008)	2b Not At Risk
RD4b Forestry - Suspended Solids (2008)	2b Not At Risk
RD4c Forestry - Eutrophication (2008)	2a Probably Not At Risk
RD5a Unsewered Areas - Pathogens (2008)	2a Probably Not At Risk
RD5b Unsewered Phosphorus (2008)	2b Not At Risk
RD5 Overall Unsewered (2008)	2b Not At Risk
RD6a Arable	2a Probably Not At Risk
RD6b Sheep Dip	2b Not At Risk
RD6c Forestry - Dangerous Substances	2b Not At Risk
RDO Diffuse Overall -Worst Case (2008)	1b Probably At Risk

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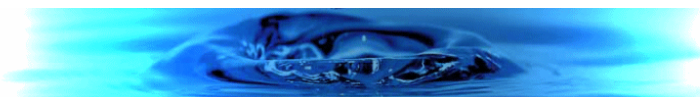


Morphological Risk Sources		
RM1	Channelisation (2008)	2b Not At Risk
RM2	Embankments (2008)	2b Not At Risk
RM3	Impoundments	2b Not At Risk
RM4	Water Regulation	2b Not At Risk
RM0	Morphology Overall - Worst Case (2008)	2b Not At Risk
Q/RDI or Point/Diffuse		
OPD	Q class/EPA Diffuse Model or worst case of Point and Diffuse (2008)	1a At Risk
Hydrology		
RHY1	Water balance - Abstraction	2b Not At Risk
Overall Risk		
RA	Rivers Overall - Worst Case (2008)	1a At Risk

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Date Report Created 02/06/2009



Objectives Report

WaterBody Category: Subbasin Waterbody
 WaterBody Name: Kiltha, Trib of Womanagh
 WaterBody Code: IE_SW_19_1909
 Overall Objective: **Restore**

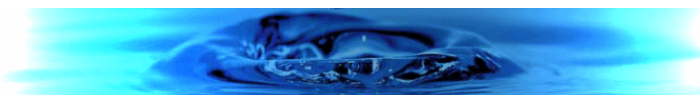


Objectives Description		Result
Objectives		
OB1	Objective 1 - Protected Areas	Not Applicable
OB2	Objective 2 - Protect High and Good Status	Not Applicable
OB3	Objective 3 - Restore Less Than Good Status	Restore
OB4	Objective 4 - Reduce Chemical Pollution	Not Applicable
OBO	Overall Objective	Restore
Deadline		
YR	Default Year by which the objective must be met	2015
EX	Revised Objective Deadline	2015
OBO	Overall Objective and Deadline	Restore - 2015

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Date Report Created 02/06/2009



Basic Measures Report

WaterBody Category: Subbasin Waterbody
 WaterBody Name: Kilha, Trib of Womanagh
 WaterBody Code: IE_SW_19_1909



	Basic Measures Description	Applicable
	Key Directives	
BA	Bathing Waters Directive	No
BI	Birds Directive	No
HA	Habitats Directive	No
DW	Drinking Waters Directive	Yes
SEV	Major Accidents and Emergencies (Seveso) Directive	Yes
EIA	Environmental Impact Assessment Directive	Yes
SE	Sewage Sludge Directive	Yes
UW	Urban Waste Water Treatment Directive	Yes
PL	Plant Protection Products Directive	Yes
NI	Nitrates Directive	Yes
IP	Integrated Pollution Prevention Control Directive	Yes
	Other Stipulated Measures	
CR	Cost recovery for water use	Yes
SU	Promotion of efficient and sustainable water use	Yes
DWS	Protection of drinking water sources	Yes
AB	Control of abstraction and impoundments	Yes
PT	Control of point source discharges	Yes
DI	Control of diffuse source discharges	Yes
GWD	Authorisation of discharges to groundwater	No
PS	Control of priority substances	Yes
MOR	Control of physical modifications to surface waters	Yes
OA	Controls on other activities impacting on water status	Yes
AP	Prevention or reduction of the impact of accidental pollution incidents	Yes

Date Reported to Europe: 22/12/2008

Date Report Created 02/06/2009



Urban and Industrial Discharges Supplementary Measures Report

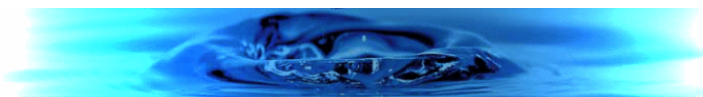
WaterBody Category: Subbasin Waterbody
 WaterBody Name: Kiltha, Trib of Womanagh
 WaterBody Code: IE_SW_19_1909



	Point discharges to waters from municipal and industrial sources	Result
PINDDIS	Is there one or more industrial discharge (Section 4 licence issued by the local authority or IPPC licence issued by the EPA) contained within the water body?	No
PINDDISR	Are there industrial discharges (Section 4 licence issued by the local authority or IPPC licence issued by the EPA) that cause the receiving water to be 'At Risk' within the water body?	No
PB1	Basic Measure 1 - Measures for improved management.	Yes
PB2	Basic Measure 2 - Optimise the performance of the waste water treatment plant by the implementation of a performance management system.	No
PB3	Basic Measure 3 - Revise existing Section 4 license conditions and reduce allowable pollution load.	Yes
PB4	Basic Measure 4 - Review existing IPPC license conditions and reduce allowable pollution load.	Yes
PB5	Basic Measure 5 - Investigate contributions to the collection system from unlicensed discharges.	Yes
PB6	Basic Measure 6 - Investigate contributions to the collection system of specific substances known to impact ecological status.	Yes
PB7	Basic Measure 7 - Upgrade WWTP to increase capacity.	Yes
PB8	Basic Measure 8 - Upgrade WWTP to provide nutrient removal treatment.	Yes
PS1	Supplementary Measure 1 - Measures intended to reduce loading to the treatment plant.	Yes
PS2	Supplementary Measure 2 - Impose development controls where there is, or is likely to be in the future, insufficient capacity at treatment plants.	Yes
PS3	Supplementary Measure 3 - Initiate investigations into characteristics of treated wastewater for parameters not presently required to be monitored under the urban wastewater treatment directive.	No
PS4	Supplementary Measure 4 - Initiate research to verify risk assessment results and determine the impact of the discharge.	Yes
PS5	Supplementary Measure 5 - Use decision making tools in point source discharge management.	Yes
PS6	Supplementary Measure 6 - Install secondary treatment at plants where this level of treatment is not required under the urban wastewater treatment directive.	No
PS7	Supplementary Measure 7 - Apply a higher standard of treatment (stricter emission controls) where necessary.	Yes

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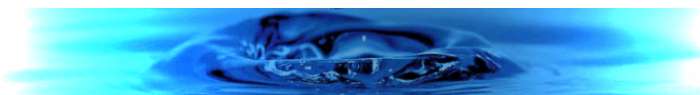


PS8	Supplementary Measure 8 - Upgrade the plant to remove specific substances known to impact on water quality status.	No
PS9	Supplementary Measure 9 - Install ultra-violet or similar type treatment.	No
PS10	Supplementary Measure 10 - Relocate the point of discharge.	Yes

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Physical Modifications Supplementary Measures Report

WaterBody Category: Subbasin Waterbody
 WaterBody Name: Kiltha, Trib of Womanagh
 WaterBody Code: IE_SW_19_1909

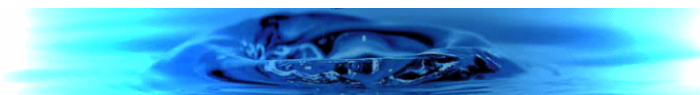


	Physical Modifications Supplementary Measures	Applicable
	Reduce	
SM1	Codes of Practice	Yes
SM2	Support for voluntary initiatives	Yes
	Remediate	
SM3	Channelisation impact remediation schemes	No
SM4	Channelisation investigation	No
SM5	Overgrazing remediation	No
SM6	Impassable barriers, impact confirmed, investigation into feasibility of remediation required	No
SM7	Impassable barriers investigation	Yes

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Unsewered Properties Supplementary Measures Report

WaterBody Category: Subbasin Waterbody
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 WaterBody Code: IE_SW_19_1909

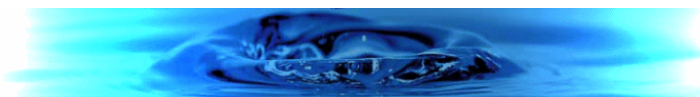


Supplementary Measures for Unsewered Properties		Applicable
SP1	Amend building regulations	Yes
SP2	Establish certified expert panels for site investigation and certification of installed systems	Yes
SP3	Assess applications for new unsewered systems by applying risk mapping/decision support systems and codes of practice	Yes
SP4	Carry out an inspection programme in prioritised locations for existing systems and record results in an action tracking system	No
SP5	Enforce requirements for percolation	No
SP6	Enforce requirements for de-sludging	Yes
SP7	Consider connection to municipal systems	No

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Forestry Measures Report

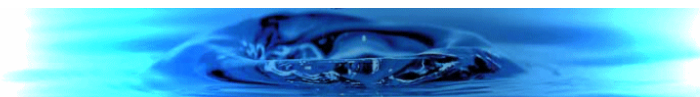
WaterBody Category: Subbasin Waterbody
 WaterBody Name: Kiltha, Trib of Womanagh
 WaterBody Code: IE_SW_19_1909



	Forestry Measures for	Applicable
	Forestry	
SF1	Management Instruments - Ensure regulations and guidance are cross referenced and revised to incorporate proposed measures	No
SF2	Acidification - Avoid or limit afforestation on 1st and 2nd order stream catchments in acid sensitive areas	No
SF3	Acidification - Revise the Acidification Protocol to ensure actual minimum alkalinities are detected and revise boundary conditions for afforestation in acid sensitive areas	No
SF10	Pesticide Use - Pre-dip trees in nurseries prior to planting out	No
SF11	Pesticide Use - Maintain registers of pesticide use	No
SF12	Acidification - Restructure existing forests to include open space and structural diversity through age classes and species mix, including broadleaves	No
SF13	Acidification - Mitigate acid impacts symptomatically using basic material	No
SF14	Acidification - Manage catchment drainage to increase residence times and soil wetting	No
SF15	Acidification - Implement measures to increase stream production.	No
SF16	Eutrophication - Establish riparian zone management prior to clearfelling	No
SF17	Eutrophication and Sedimentation - Enhance sediment control	No
SF18	Eutrophication - Manage catchment drainage to increase residence times and soil wetting, including no drainage in some locations	No
SF19	Sedimentation - Establish riparian zone management prior to clearfelling	No
SF20	Sedimentation - Enhance sediment control	No
SF21	Sedimentation - Manage catchment drainage to increase residence times and soil wetting, including no drainage in some locations	No
SF22	Hydromorphology - Enhance drainage network management, minimise drainage in peat soils	No
SF23	Pesticide Use - Develop biological control methods	No

Date Reported to Europe: 22/12/2008

Date Report Created 02/06/2009



SF4	Eutrophication and Sedimentation - Avoid or limit forest cover on peat sites	No
SF5	Eutrophication and Sedimentation - Change the tree species mix on replanting	No
SF6	Eutrophication and Sedimentation - Limiting felling coup size	No
SF7	Eutrophication and Sedimentation - Establish new forest structures on older plantation sites	No
SF8	Hydromorphology - Audit existing drainage networks in forest catchments	No
SF9	Pesticide Use - Reduce pesticide usage	No

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