Environmental Protection Agency
Office of Climate, Licensing and Resource Use,
PO Box 3000
Johnstown Castle Estate,
Wexford

29th June 2012

RE: Application for Discharge Licence for Kilmurry Ibrickane Agglomeration (Quilty Wastewater Treatment Plant)

A chara

Please find enclosed all documentation pertaining to the application by Clare County Council for a Waste Water Discharge Licence for the Waste Water Treatment Plant in Quilty serving the Kilmurry Ibrickane agglomeration. The application is submitted in accordance with Regulation 16 of the (Authorisation) Regulations, 2007, in the form of:

a. 1 No Completed Application Form original plus 2 No Copies
b. 1 No CD-Rom Disk

A cheque of €15,000 in payment of the application fee is attached with the application.

I declare that the content of the electronic files are a true copy of the original hardcopy application.

Mise le meas

Sean Ward
Senior Engineer
Transportation, Water Services and Environment Directorate

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Waste Water Discharge (Authorisation) Regulations 2007

Application

for

Waste Water Discharge Licence

Kilmurry Ibrickane

Co. Clare

Comhairle Contae an Chláir
Clare County Council

Date: June 2012

Waste Water Discharge Licence Application Form

Kilmurry Ibrickane CO. CLARE

EPA Ref. Nº: *(Office use only)*	

Environmental Protection Agency
PO Box 3000, Johnstown Castle Estate, Co. Wexford
Lo Call: 1890 335599 Telephone: 053-9160600 Fax: 053-9160699
Web: www.epa.ieEmail: 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	26/08/2007	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.

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

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ANNEX 1: TABLES / ATTACHMENTS

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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 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. <u>The abbreviation "N/A" should not be used</u>.

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.

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 Nº A.1**

SECTION B: GENERAL

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

B.1 Agglomeration Details

Name of Agglomeration:	Kilmurry Ibrickane

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*:	CLARE COUNTY COUNCIL
Address:	Attention: Myles Carey
	Environment and Water Services Directorate
	Áras Contae an Chláir
	New Road, Ennis, Co. Clare.
Tel:	065 6821616
Fax:	065 6821915
e-mail:	wwdl@clarecoco.ie

*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*:	SEAN Ward Senior Engineer
Address:	Clare County Council
	Environment and Water Services Directorate
	Áras Contae an Chláir
	New Road, Ennis, Co. Clare
Tel:	065 6821616
Fax:	065 6821915
e-mail:	sward@clarecoco.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:	
Tel:	
Fax:	
e-mail:	

*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*:	**Coffey Water Ltd**
Address:	Coffey Group
	Athenry
	Co. Galway
Tel:	091 844356
Fax:	091 844519
e-mail:	

*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 (≤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.1	

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*:	Derek Troy
Address:	Tromracastle
	Quilty
	CO. CLARE
Grid ref (6E, 6N)	E100363; N173396;
Level of Treatment	SECONDARY
Primary Telephone:	065 9051047
Fax:	065 9052821
e-mail:	dtroy@clarecoco.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 (≤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.2	

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	Diffuser outfall
Unique Point Code	(P) SW1
Location	Shannon Plume Code: IE_SH_070_0000
Grid ref (6E, 6N)	E100590; N174540;

Attachment B.3 should contain appropriately scaled drawings / maps (≤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.1	

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	
Location	
Grid ref (6E, 6N)	

Attachment B.4 should contain appropriately scaled drawings / maps (≤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	**Not Applicable**
Unique Point Code	
Location	
Grid ref (6E, 6N)	

Attachment B.5 should contain appropriately scaled drawings / maps (≤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:	CLARE COUNTY COUNCIL
Address:	Economic Development & Planning Directorate
	Áras Contae an Chláir, New Road,
	Ennis, Co Clare
Tel:	065 6821616
Fax:	065 6892071
e-mail:	plannoff@clarecoco.ie

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

has been obtained	√	***is being processed***	
is not yet applied for		***is not required***	

Local Authority Planning File Reference Nº:	**LA03-10**

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
	√ B.6 F.1.2	

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
Address:	SANDFIELD HOUSE
	ENNIS
	CO. CLARE
Tel:	065 6868090
Fax:	065 6868001
e-mail:	clare.ehos.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:	
Tel:	
Fax:	
e-mail:	

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 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 (≤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 two copies of the application.

Attachment included	**Yes**	**No**
	√ B.8	

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	**1,109**
Data Compiled (Year)	**2004**
Method	*Sewerage Scheme Updated Preliminary Report, by Nicholas O'Dwyer, Consultant Engineers December 1999*

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.

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 €)**
	15,000

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 Forsehore 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.

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.

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
	√	

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	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
Point Code Provide label ID's	Point Type (e.g., Primary/ Secondary/ Storm Water Overflow)	Local Authority Name (e.g., Donegal County Council)	Receiving Water Body Type (e.g., River, Lake, Groundwater, Transitional, Coastal)	Receiving Water Body Name (e.g., River Suir)	Protected Area Type (e.g., SAC, candidate SAC, NHA, SPA etc.)	6E-digit GPS Irish National Grid Reference	6N-digit GPS Irish National Grid Reference
P(SW1)	Primary	Clare County Council	Coastal	Shannon Plume	SAC; SPA	100590	174540

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.

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.

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

Attachment included	Yes	No
	√	

E.3. Tabular data on Monitoring and Sampling Points

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

PT_CD	PT_TYPE	MON_TYPE	EASTING	NORTHING	VERIFIED
Point Code Provide label ID's assigned in section E of application	Point Type (e.g., Primary, Secondary, Storm Water Overflow)	Monitoring Type M = Monitoring S = Sampling	6E-digit GPS Irish National Grid Reference	6N-digit GPS Irish National Grid Reference	Y = GPS used N = GPS not used
P SW1	Primary	S	100356	173424	Y
aSW1	Primary	M	100456	174828	Y

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

An individual record (i.e. row) is required for each abstraction point. Acceptable file formats include Excel, Access or other upon agreement with the Agency. A standard Excel template can be downloaded from the EPA website at www.epa.ie. 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.: **Not Applicable**

SECTION G: PROGRAMMES OF IMPROVEMENTS

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

G.1 Compliance with Council Directives

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

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

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

Attachment included	Yes	No
		√

G.2 Compliance with Water Quality Standards for Phosphorus Regulations (S.I. No. 258 of 1998).

Provide details on a programme of improvements, including any water quality management plans or catchment management plans in place, to ensure that improvements of water quality required under the Water Quality Standards for Phosphorous Regulations (S.I. No. 258 of 1998) are being achieved. Provide details of any specific measures adopted for waste water works specified in Phosphorus Measures Implementation reports and the progress to date of those measures. Provide details highlighting any waste water works that have been identified as the principal sources of pollution under the P regulations.

Attachment G.2 should contain the most recent programme of improvements and any associated documentation requested under Section G.3 of the application.

Attachment included	Yes	No
		√

G.3 Impact Mitigation

Provide details on a programme of improvements to ensure that discharges from the agglomeration will not result in significant environmental pollution.

Attachment G.3 should contain the most recent programme of improvements, including a copy of any approved funding for the project and a timeframe for the completion of the necessary works to take place.

Attachment included	Yes	No
		√

G.4 Storm Water Overflow

Provide details on a programme of improvements to ensure that discharges other than the primary and secondary discharges comply with the definition of 'storm water overflow' as per Regulation 3 of the Waste Water Discharge (Authorisation) Regulations, 2007.

Attachment G.4 should contain the most recent programme of improvements, including a copy of any approved funding for the project and a timeframe for the completion of the necessary works to take place.

Attachment included	Yes	No
		√

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 :** 26/6/2012
(on behalf of the organisation)

Print signature name: Ms. ANNE HAUGH

Position in organisation: DIRECTOR OF SERVICES TRANSPORTATION ENVIRONMENT & WATER SERVICES

SECTION I: JOINT DECLARATION

Joint Declaration [Note1]

I hereby make application for a waste water discharge licence/revised licence, pursuant to the provisions of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007).

I certify that the information given in this application is truthful, accurate and complete.

I give consent to the EPA to copy this application for its own use and to make it available for inspection and copying by the public, both in the form of paper files available for inspection at EPA and local authority offices, and via the EPA's website.

This consent relates to this application itself and to any further information or submission whether provided by me as Applicant, any person acting on the Applicant's behalf, or any other person.

Lead Authority

Signed by :_____ **Date :**_____
(on behalf of the organisation)

Print signature name: _____

Position in organisation:_____

Co-Applicants

Signed by :_____ **Date :**_____
(on behalf of the organisation)

Print signature name: _____

Position in organisation:_____

Signed by :_____ **Date :**_____
(on behalf of the organisation)

Print signature name: _____

Position in organisation:_____

Note 1: In the case of an application being lodged on behalf of more than a single water services authority the following declaration must be signed by all applicants.

Attachment A.1

Clare County Council

Application for wastewater discharge licence for Kilmurry Ibrickane treatment plant

Non-technical summary

Kilmurry Ibrickane

In accordance with Article 5 of Waste Water Discharge (Authorisation) Regulations, S.I. 684 of 2007

Section A

1 Introduction

Clare County Council is required to make an application to the Environmental Protection Agency (EPA) for a licence to discharge treated wastewater from the wastewater treatment plant (WWTP) at Tromracastle, serving the Kilmurry Ibrickane agglomeration, in accordance with Article 5 of the *Wastewater Discharge (Authorisation) Regulations, 2007 as amended in 2010* (S.I. No. 684 of 2007 and S.I. 231 of 2010). The application form and its attachments are completed as required by the EPA in accordance with guidance notes provided.

2 Description of Kilmurry Ibrickane

The Kilmurry Ibrickane agglomeration is located along the west coast of Clare, south of Miltown Malbay. The agglomeration includes the villages of Quilty, which is located approximately 6 kilometres to the southwest of Miltown Malbay along the coastline, and Mullagh village, approximately 4 kilometers inland southeast of Quilty village. The agglomeration also extends southwest of Quilty to include Seafield and Tromra townlands. Up until late 2010, all foul wastewaters were treated by onsite wastewater treatment systems with no sewer network within the Kilmurry Ibrickane area. A new WWTP and sewer network was constructed in 2010 to serve the area and the plant became operational in June 2011. The 20 day performance test (commissioning of the plant) was carried out in late August – early September 2011. A map indicating the agglomeration, the location of the Kilmurry Ibrickane wastewater treatment plant, the pumping stations and monitoring points is provided as Attachment B.1. A site layout plan of the wastewater treatment plant is provided as Attachment B.2.

3 Wastewater sources

The sewer network and WWTP is recently constructed and was commissioned in September 2011. Domestic wastewater is the main component of discharge to the wastewater treatment plant serving the Kilmurry Ibrickane agglomeration. There are no industrial sector discharges to the plant. Commercial discharges are typically licenced premised, schools, GAA clubs and retail outlets. Due to the extensive area of the agglomeration six pump stations deliver wasterwaters to the WWTP and their locations are provided in the map labelled Attachment B.1.

4 The Wastewater Treatment Plant (WWTP)

The WWTP serving the Kilmurry Ibrickane agglomeration was constructed in 2010 and commissioned in September 2011, and is located in the townland of Tromracastle to the southwest of Quilty and west of Mullagh. Effluent from the plant discharges to coastal waters approximately 350 meters offshore to the northeast of Seafield Quay. The National Grid Reference for the Primary Discharge Point P(SW1) at the end of the outfall pipe is E100595; N174540. A map indicating the location of discharge point is provided as Attachment B.1.

5 Wastewater Flows

The design capacity for the plant is 1,365 population equivalent (PE) by 2025. At the time of planning for the new plant in 2004, the estimated existing PE for the area was

calculated as 1,109 PE. This calculation includes an increase in population due to seasonal variation in summer, as the estimated winter population is calculated at 450PE. The design data for the WWTP is summarized in Table 1 hereunder:

Table 1: Design data for Kilmurry Ibrickane WWTP

Population Equivalent	1,365 PE
Average Design Flow	3.6 l/s
Peak flow to treatment	10.7 l/s
Outfall Capacity	56.9 l/s

When flow data to the WWTP for the period June 2011 to March 2012 inclusive, was examined, the average flow value arriving at the treatment works was calculated as 138m^3/day. The average BOD of the influent is 76mg O_2/litre. This equates to a population equivalent for this loading of 175 PE. The approach to estimation of population equivalent is in accordance with the definition provided in the Waste Water Discharge (Authorisation) Regulations, 2007 (*"population equivalent" is a measurement of organic biodegradable load and a population equivalent of 1 (1 p.e.) means the organic biodegradable load having a five-day biochemical oxygen demand (BOD_5) of 60g of oxygen per day; the load being calculated on the basis of the maximum average weekly load entering the waste water works during the year, excluding unusual situations such as those due to heavy rain*). Using the average flow for the period June 2011 to March 2012, the total hydraulic load arriving at the WWTP is calculated as a population equivalent of 613 PE.

The existing BOD loading to the WWTP of 175 PE, as calculated over the period January to July 2011, provides scope for increases in the loading to the plant from developments within the agglomeration area, which have not yet been connected to the sewer network. Details of planning permissions granted since 2005 within the agglomerations area, which have not yet commenced and which are due to be connected to the sewer network are provided in Attachment B.9(ii) to this application.

6 Treatment Process Description

The new WWTP design is based on a sequencing batch reactor (SBR) plant with pretreatment, by screening, and storm overflow interception. The facility consists of the following elements:

- Inlet screening, fitted with coarse and fine screens, flow activated and equipped with a collection bin for inorganic screenings.*
- Splitter chamber.*
- Grit Separator with overflow to storm holding tank.*
- Inlet buffer tank.
- Sequencing Batch Reactor operated on a six cycle rotation.
- Ultraviolet disinfection of the final effluent.
- Inflow and outflow monitoring (including storm overflow).
- Sludge storage facility.
- Administration Control house.

*All linked to a carbon filter for odour control.

Sludge is drawn from the SBR tank during the decant cycle and stored on site in a sludge storage tank, with removal of sludge off site for further processing

7 Storm overflows

There is no storm overflow facility provided within the sewer network serving Kilmurry Ibrickane. During storm events the excess flow to the plant is diverted to the storm tank for temporary storage before being returned to the inlet flow point once normal flows to the plant resume.

8 Impact of emissions from the WWTP serving the Kilmurry Ibrickane agglomeration on the receiving waters.

The impact of discharges from the Kilmurry Ibrickane WWTP on the receiving waters of the Shannon Plume Code: IE_SH_070_0000 is considered under a number of headings:

8.1 Description of receiving waters
8.2 Assessment of impact of the discharge on the receiving waters
8.3 Measures undertaken to ensure the discharge will not significantly impact on pathogen numbers in the receiving waters
8.4 Total maximum nutrient load discharging to receiving waters
8.5 Assimilative capacity of the receiving waters
8.6 Statutory Designations of the Receiving Waters

8.1 Description of the Receiving Waters

The discharge from the WWTP serving the Kilmurry Ibricane agglomeration drains into the coastal waters the Shannon Plume Code: IE_SH_070_0000. The waterbody covers an area of 379km^2 and stretches from the mouth of the Shannon estuary in the south, along the County Clare coastline to Black Head to the north. The Water Framework Directive (WFD) 2000/60/EC, includes the objective of attaining good status in water bodies that are of lesser status at present and retaining good status or better where such status exists at present. A quality status has not been assigned to this waterbody. The full report for the waterbody Shannon Plume is provided as Attachment F.1.1.

8.2 Assessment of Impact of the discharge on the receiving waters

There is no monitoring of the receiving waters undertaken at present. However Clare County Council, during the course of preparing the application to the EPA for a discharge authorisation**,** under the *Wastewater Discharge (Authorisation) Regulations 2007, (S.I No 684 of 2007)* for the WWTP serving the Kilmurry Ibrickane agglomeration, carried out monitoring of the effluent discharge from the WWTP and the receiving waters in the vicinity of the discharge point. Monitoring of the discharge was undertaken in November 2011 and of the ambient receiving waters in May 2012. The results of the monitoring do not indicate an impact on the receiving waters from the discharge.

The agglomeration area was also assessed to identify any facility liable to generate substances listed in Annex X of the Water Framework Directive (2000/60/EC) or relevant pollutants listed in Annex VIII of the Water Framework Directive. The results of the monitoring do not indicate any substance on the list was present in the receiving waters or in the discharges from the WWTP (see Annex 1). No potential source of these pollutants has been identified in the sewer catchment, so it is unlikely that the discharge will contain any of the listed substances.

8.3 Measures undertaken to ensure the discharge will not significantly impact on pathogen numbers in the receiving waters.

To eliminate any significant impact on the receiving waters from faecal coliform, salmonella and protozoan pathogen numbers, the final effluent is passed through a Ultraviolet disinfection unit at the end of the treatment process before discharge to the coastal receiving waters namely the Shannon Plume Code: IE_SH_070_0000.

8.4 Assessment of the Discharge

Ongoing monitoring data for the discharge from the WWTP serving the Kilmurry Ibrickane agglomeration is available since June 2011 and is used for this application. Flow data for both the influent and effluent to the plant is recorded daily. The flow records indicate the range of flow from the WWTP is between 36 and 674m^3/day during the period June 2011 and March 2012. The average flow discharging from the WWTP for this period is 138m^3/day. Monitoring results of the effluent are provided in Tables 1a and 1b below.

8.5 Assimilative capacity of the Receiving Waters

The outfall from the WWTP serving the Kilmurry Ibrickane agglomeration is to coastal waters and hence a foreshore licence was required at the planning stages of the development. As part of the foreshore licence application, an environmental assessment was carried out of the potential impacts of the pipeline on the environment, which included information on the projected nutrient discharge. A copy of the environmental assessment is provided in Attachment F.1.2. The results of nutrient dilution calculation indicate that the nitrogen compounds would be rapidly diluted below threshold levels for impacts within a short distance of the point of discharge and therefore unlikely to have a significant effect on the receiving waters.

8.6 Statutory designations of the Receiving Waters

(i) The receiving waters are designated as both a Special Area of Conservation (SAC) Site: *Carrowmore Point to Spanish Point and Islands*, Code: 001021 and a Special Protection Area (SPA) Site: *Mid Clare Coast*, Code: 004182. A description of both sites and their objectives is provided in Attachment F.1.3. An appropriate assessment screening process was undertaken to determine the potential impacts, if any, of the wastewater discharge from the Kilmurry Ibrickane agglomeration on the designated sites and is provided in Attachment F.1. Appropriate Assessment.

(ii) In accordance with Regulation 4 of the Quality of Bathing Water Regulations, 2008, three beaches, that are located in proximity to the discharge point from the WWTP, have been designated as Bathing Areas. Details of the three beaches are provided in Table 3 below. Bathing water profiles for all three beaches have been established and in accordance with Regulation 11 of the above Regulations, the water quality for all three bathing areas has been assessed as Good status.

Table 3 List of Designated Bathing Waters in vicinity of discharge

No.	*Name*	*Distance from Discharge*
1	Whitestrand Doonbeg	8.8 km to the south-west
2	Spanish Point	4.0 km to the north-east
3	Whitestrand Miltown Malbay	6.9 km to the north north-east
4[1]	Seafiled, Quilty	1.4 km to the south-west

Both beaches at White Strand Doonbeg and at White Strand Miltown Malbay retain Blue Flag status for which high water quality is required. The beach at Seafield, Quilty, located approximately 1.4 kilometers to the southwest of the discharge point is not a designated bathing water but is monitored during the bathing season. Monitoring data for all four bathing areas for the period 2011 is provided in Attachment F.1.4. A copy of the Bathing Water Profiles for the three designated beaches is provided in Attachment F.1.5.

(iii) There are no areas designated for the abstraction of water intended for human consumption situated downstream of the receiving waterbody.

(iv) The receiving waterbody is not designated as an area for the protection of economically significant aquatic species (fish, shellfish).

(v) The receiving waterbody is not designated as an nutrient sensitive area.

9 Proposed technology for improving emissions from WWTP

As the sewer network and WWTP serving the Kilmurry Ibrickane agglomeration is recently constructed and was only commissioned in September 2011. There are no proposals in place for upgrading of the wastewater treatment facilities and their associated pumping stations.

10 Measures planned to monitor emissions into the environment

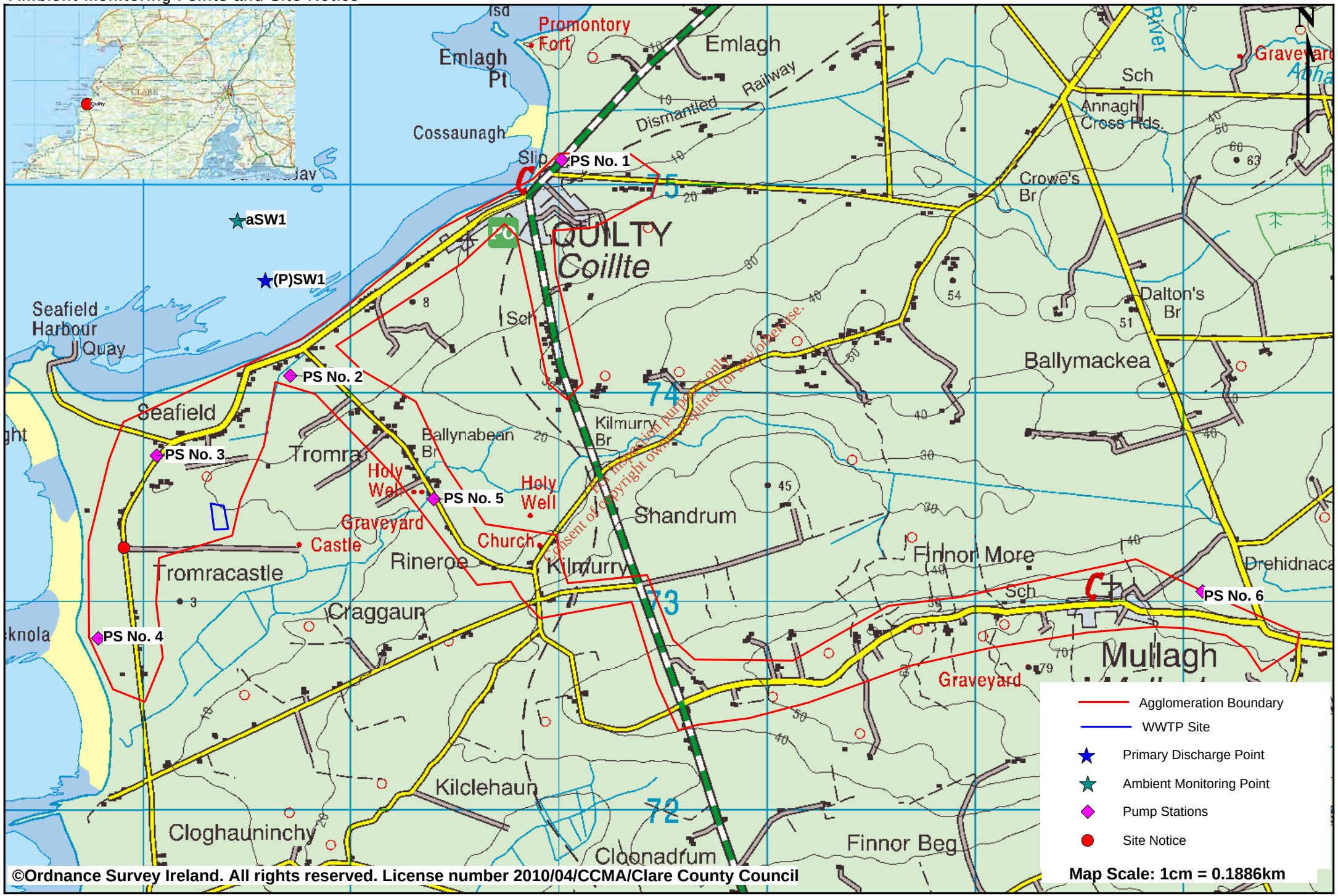
Provisions for monitoring emissions from the wastewater treatment plant are in place at the WWTP. The wastewater treatment plant is operated by Coffey Water, as the "operate" element of a Design-Build-Operate Contract. Monitoring of influent and effluent wastewater streams is undertaken on a monthly basis for the parameters biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS), Total nitrogen (TN), total phosphorus (TP) and Ammonia (NH_3-N). In addition bacterial analysis is carried out of the effluent on a monthly basis. Since the commissioning of the WWTP in June 2011, the discharge from the plant is in compliance with Urban Waste Water Regulations as amended.

Samples are taken as 24 hour composite samples and the methods of analysis used are in accordance with Standard Methods for the Examination of Water and Wastewater.

[1] Beach at Seafield, Quilty is not designated as a Bathing Area but is monitored by Clare County Council

Attachment B.1 Map showing Kilmurry Ibrickane Agglomeration, WWTP, Pump Stations, Primary Discharge, Ambient Monitoring Points and Site Notice

June 2012



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NORTH

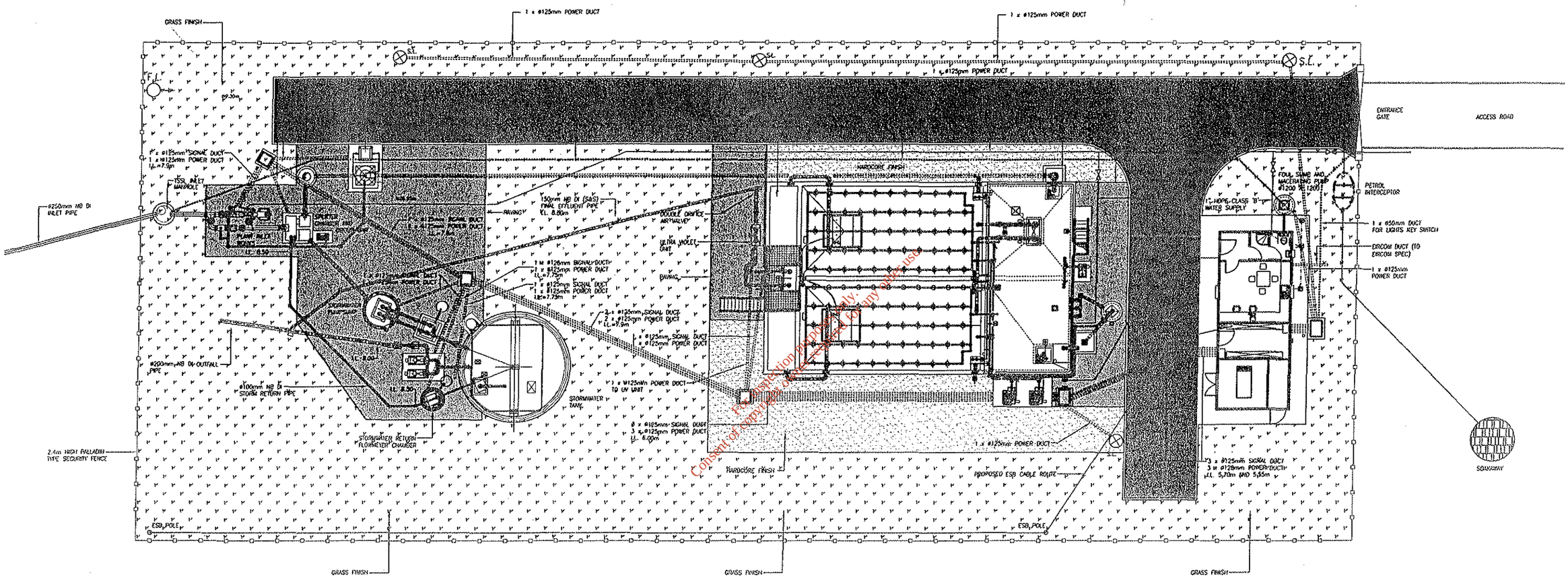
NOTES:

1. LOCATION OF INCOMING ELECTRICITY SUPPLY TO BE CONFIRMED
2. SERVICE WATER SUPPLY TO BE CONFIRMED
3. ALL FINISHED GROUND LEVELS TO BE CHECKED WITH CIVIL ENGINEER (TSSL)
4. ALL CIVIL DETAILS INCLUDING OPES, PUDDLE PIPES, REBATES, COVERS ANCHOR BLOCKS AND MISCELLANEOUS DETAILS TO BE CHECKED BY CIVIL ENGINEER (TSSL)
5. FINAL POSITION OF ISOLATORS AND E-STOPS TO BE DECIDED ON SITE.

LEGEND:

S.L. — STREET LIGHT – 100 WATT SON x 5m HIGH

F.L. — FLOOD LIGHTING – 300 WATT METAL HALIDE x 3m HIGH



Rev.	Date	By	Description	Chkd.
A	JUL'09	MC	SECOND DESIGN SUBMISSION	
	APR'09	EMP	FIRST DESIGN SUBMISSION	

REVISION DETAILS

TREATMENT SYSTEMS
WATER WASTEWATER DESIGN AND ENGINEERING
Canices Court, Dean St., Kilkenny, Ireland
(056) 7763932 (056) 7763933

Client: CLARE COUNTY COUNCIL

Title: QUILTY MULLAGH WASTEWATER TREATMENT PLANT
WASTEWATER TREATMENT WORKS
SITE SERVICES

Scale:	Drawn:	Checked:	Date:	Drawing No: T020_03_5016	Revision:
1:150	EMP		AUG'08	File Name: S1451-03GA10	A

Clare County Council – Planning Section
Planning and Development Regulations, 2001. Part VIII

Eddie Power,
Senior Executive Officer,
Water Services.

December, *2003.*

Development: **The Feakle, Scariff, Quilty Sewerage Scheme.**

Location: **Feakle, Scariff, Quilty, Co. Clare.**

File No: **LA03-10**

This application is being made under the Part VIII procedure in accordance with the Planning & Development Regulations, 2001.

1. **Nature and extent of the proposed development and the principle features thereof.**

It is proposed to upgrade the existing wastewater treatment works for the village of Scarriff and Tuamgraney. The present facility is located at Drewsborough, Scarriff adjacent to the Scarriff Dock currently the site of construction works for the upgrade and extension of the marina, granted to Waterways Ireland p01-1176 and Construction of 2-storey office building (p01-1519). It is proposed that the treated effluent will be discharged to the Scarriff River.

It is proposed to construct a waste water treatment works at Baurroe, Feakle. The proposal will result in the removal of existing septic tanks and private waste water treatment systems in a substantial area which will have environmental benefits to this location. It is proposed that the treated effluent will be discharged to the Glenbonniv River.

It is proposed to construct a public waste water treatment works for the provision of a public sewer for the general area of Quilty and Mullagh. The proposal will result in the removal of existing septic tanks and private waste water treatment systems in a substantial area which will have environmental benefits to this coastal location. The proposal is to provide a new treatment works and the sewerage collection network will include six pump stations located at various sites in the vicinity of Quilty, Seafield and Mullagh. It is proposed that the treated effluent will be discharged to the Atlantic Ocean.

2. **Evaluation of the likely implications, if any, of the proposed development with respect to the proper planning and development of the area in which the development would be situated.**

There are no significant impacts in planning terms with the proposed Scarriff upgrade. The proposal will improve the current situation with regards the public sewerage system servicing this area.

There are no significant impacts in planning terms with the proposed Feakle waste water treatment plant. The proposal will result in the removal of existing septic tanks and private waste water treatment systems in a substantial area which will have environmental benefits to this location.

It is considered that the proposed Quilty Mullagh waste water treatment plant posed the most problematic development of the 3 no. plants. The coastal location and the visual impacts as well as the potential impacts on surface waters and the discharge to the sea have been the subject of much concern to the Planning Authority. However, following detailed discussions with the consultants and the submission of detailed impact assessments and reports, it is considered that the development will result in the removal of existing septic tanks and private waste water treatment systems in a substantial area which will have environmental benefits to this coastal location. Conditions are proposed to be attached to control the impacts of the development.

3. **List of persons or bodies who made submissions or observations.**

Scarriff: Andrew Dundas has made a submission indicating concerns regarding the potential to restrict his spread lands for slurry. The Planning Authority is satisfied that the 3rd party will not be restricted by direct result of this development.

Quilty: Margaret & Joseph Ryan and Noelette & Joe Casey of Seafield submitted substantial objections, mainly with regards pump station no. 2 amongst other issues. It is considered that the concerns as submitted can be addressed and conditions of planning will be attached to ensure the highest standard of development, construction and maintenance.

4. **Summary of the issues with respect to the proper planning and orderly development of the area raised by persons making submissions.**

Quilty: Issues raised summarised as follows:

a) Proximity of pump station 2 to a new dwelling currently under construction
b) The pump station will have significant adverse effects on the property with regards, public health, nuisances, disturbance, will devalue property and destroy the visual amenity from living areas of the house.
c) This is a visually vulnerable area and if permitted, pump station no.2 will block views to the sea and natural light

d) The existing dwelling has not been indicated on the submitted plans and this is contrary to the planning regulations. The proposed 3.5 metre high structure will completely obliterate the views to the sea
e) Proposed open grating to the foul water sump will result in an odour nuisance. All the activity will be within 10 metres of the living area of the dwelling. The prevailing winds will also accentuate this problem. Best practice British and US standards would indicate that minimum separation distances between pump stations and dwellings be 20 metres.
f) No specific details for odour control proposed
g) Noise impact will be significant
h) Faecal coliform contamination in drains due to overflow. This is generally due to mechanical or electrical failure. In the event of such an event, the public health concerns would be potentially disastorous.
i) Proposals for the removal of debris not included in submission
j) The development does not conform to the County or West Clare Local Area Plans.

5. **Response of the Local Authority thereto.**

a) – g) With regards the above, it should be noted that pump house 2 has been relocated. It should also be noted that the rights of "views" is not a valid planning argument.

h) – I) Conditions will be attached to oversize all tanks to eliminate emergency overflow pipes to open land drains.

j) This issue has no basis. Provision is clearly made in the Plan for the provision of the waste water treatment plant.

6. **The manner in which the development is proposed to proceed**

Detailed reports, in terms of further information requests and issues have been prepared in relation to the above developments and are available for inspection if required. Having regard to the detail of those reports and the various assessments / considerations / objections of the various elements of the development, it is considered that the developments, subject to conditions, will represent the best environmental solution and will be in the interests of the proper planning and development of the affected areas, Feakle, Scariff and Quilty in accordance with the policies of The County Development Plan, 1999 as varied and, in relation to the Quilty proposal, the Local Area Plan for West Clare, 2003.

As such, it is recommended that planning permission be granted for the 3 no. projects subject to the following conditions being be attached for inclusion in the tender documentation:

1. **General conditions:**

➢ No decision shall be made on the final selection of the treatment plant following the tendering process without the agreement of the Planning Authority. Full

details of all tenders shall be submitted for consideration and the final selection of a treatment works shall be agreed.

- Details of a landscaping scheme for all elements of the development shall be submitted for the written agreement of the Planning Authority.

- A screening mound shall be provided around the entire circumference of the Waster Water Treatment Plant.
- Any earth mound and all visible deadwork associated with the excavation shall be planted and seeded with reasonable quality grass seed
- Details for any planting shall be submitted as part of the Tendering process

- the control houses shall be constructed in accordance with the details submitted and details of materials to be used in external finishes and roofing shall be submitted for the written agreement of the Planning Authority. A sample of the roofing material, shall be submitted.

- Any damage to public roadways in the course of construction and pipelaying shall be fully repaired to the satisfaction of the appropriate Area Roads Engineer.

Reason: In the interests of the proper planning and development of the area, the visual amenities of each area.

2. **The Plant:** As there are no final drawings available for the proposed plant, the Planning Authority will require the following conditions to be included in any Tender Documentation:

- The maximum height of any physical structure site shall not exceed 5 metres.
- Consideration will be given to the locating of the treatment plant within a building / structure which can be suitably designed and finished to assimilate into the visually vulnerable location at Quilty.
- Details of all finishes of buildings / structures shall be submitted for the written agreement of the Planning Authority and samples of all finishes shall be submitted.
- Details of landscaping shall be submitted for the written agreement of the Planning Authority. The details of a landscaping scheme shall be agreed in consultation with the Planning Authority and prior to the commencement of any development on the site. The landscaping of this site and its boundaries shall be completed in conjunction with the completion of the main plant.
- Proposals for the upgrading of the roadway accessing the site will be agreed prior to the commencement of any development on site. All existing hedgerow boundaries shall be retained along this roadway.
- Archaeological monitoring shall be undertaken during all stages of the development of the Quilty site in accordance with the details submitted on 06/10/03.
- The developer shall send written notification to the National Monuments Service, of their intention to carry out site preparation works each element of the proposed development sites at least eight weeks in advance of the commencement of works.
- The developer shall employ an archaeologist to carry out Archaeological Monitoring of all sub-surface works carried out within the proposed development

site. This will include the archaeological monitoring of the removal of topsoil, the excavation of trenches for foundations, services and drainage associated with the proposed Sewerage Treatment Works and associated pump stations and pipe works

- Should archaeological material be discovered during the course of Archaeological Monitoring, the developer shall facilitate the archaeologist in fully recording this material. The developer shall also be prepared to be advised by the National Monuments Service of the Department of the Environment with regard to the appropriate course of action, should archaeological material be discovered.
- The archaeologist shall prepare and submit a report, describing the results of the Archaeological Monitoring to the Local Authority and the National Monuments Service within six weeks following the completion of Archaeological Monitoring on site.
- Should archaeological material be found during the course of sub-surface drainage and foundation construction the developer shall fully inform the National Monuments Service of the Department of Environment to facilitate the recording of the material. The developer shall also be prepared to be advised by the National Monuments Service, with regard to the appropriate course of action should archaeological material be found.

Reason: In the interests of the proper planning and development of the area, the visual amenities of the area and the archaeological protection of the area.

Spec. for treatment requirements:

- The 5 day Biochemical Oxygen Demand of the effluent shall not exceed 25mg/l concentration at the point of discharge from the treatment plant.
- The suspended solids content of the effluent shall not exceed 35 mg/litre at the point of discharge from the treatment plant.
- The pH of the effluent discharge shall be in the range pH 6.0 to pH 9.0.
- The developer shall ensure the adequacy of the installation and commissioning period for the effluent treatment plant. Leak testing on the system should be carried out prior to commencement of operations.
- Provision shall be made at the outfall from the treatment plant, prior to discharge to the percolation area, for flow proportionate sampling in accordance with the requirements of the Urban Wastewaer Regulations 1994
- The developer shall enter into a binding contract with the plant suppliers or other competent agency for the maintenance and servicing of the treatment plant and the plant shall be services at intervals to be determined during the commissioning programme. This contract shall be renewed annually.
- The wastewater treatment unit for Quilty/Mullagh region shall be equipped with suitable disinfection equipment to enable flow proportionate dosing of the discharge during the period from early May to the end of September, each year to ensure no deterioration of bathing waters in the area
- Appropriate measures to reduce potential noise and odour associated with the operation of the pumping stations and treatment plants shall be employed.

Reason: In the interests of the proper sustainable development of the area and in the interests of environmental protection.

3. Quilty Development:

a) **Pump Station 1:** The Planning Authority indicated its concern regarding the visual implications of this pump house at this location between road and sea in a visually vulnerable area. The submitted information on 06/10/03 indicates that 2 other sites were considered for this pump house. The location of this pump house at the waste recycling facility to the site of the currently proposed site would appear to be more appropriate in terms of visuals. In this regard, the Planning Authority will require the following conditions to be included in any Tender Documentation:

- Pump Station 1 shall be relocated away from the visually vulnerable location off a designated scenic route. Prior to the commencement of any development on the site, full details of this relocation and siting shall be submitted for the written agreement of the Planning Authority.
- Pump Station 1 shall be oversized as per the details relating to pump station 4 as submitted and no emergency overflow pipes into adjacent streams or drains shall be permitted. Full details shall be submitted for agreement prior to the commencement of any development on site.
- Access shall be provided to facilitate sampling by authorised persons.

Reason: In the interests of the proper planning and development of the area, the visual amenities of the area and the environmental protection of the area.

b) **Pump Station 2:** The Planning Authority notes the relocation of this pump station away from existing dwellings. In this regard, the Planning Authority will require the following conditions to be included in any Tender Documentation:

- Pump Station 2 shall be relocated away from the existing dwellings as indicated in the submission of 06/10/03.
- Pump Station 2 shall be oversized as per the details relating to pump station 4 as submitted and no emergency overflow pipes into adjacent streams or drains shall be permitted. Full details shall be submitted for agreement prior to the commencement of any development on site.
- Access shall be provided to facilitate sampling by authorised persons.

Reason: In the interests of the proper planning and development of the area, the visual amenities of the area and the environmental protection of the area.

c) **Pump Station 3:** The Planning Authority will require the following conditions to be included in any Tender Documentation:

- Pump Station 3 shall be oversized as per the details relating to pump station 4 as submitted and no emergency overflow pipes into adjacent streams or drains shall be permitted. Full details shall be submitted for agreement prior to the commencement of any development on site.

- Access shall be provided to facilitate sampling by authorised persons.

Reason: In the interests of the proper planning and development of the area, the visual amenities of the area and the environmental protection of the area.

d) **Pump Station 4:** The Planning Authority will require the following conditions to be included in any Tender Documentation:

- Pump Station 4 shall be constructed in accordance with the details submitted.
- Access shall be provided to facilitate sampling by authorised persons.

Reason: In the interests of the proper planning and development of the area, the visual amenities of the area and the environmental protection of the area.

e) **Pump Station 5:** The Planning Authority will require the following conditions to be included in any Tender Documentation:

- Pump Station 5 shall be oversized as per the details relating to pump station 4 as submitted and no emergency overflow pipes into adjacent streams or drains shall be permitted. Full details shall be submitted for agreement prior to the commencement of any development on site.
- Access shall be provided to facilitate sampling by authorised persons.

Reason: In the interests of the proper planning and development of the area, the visual amenities of the area and the environmental protection of the area.

f) **Pump Station 6:** The Planning Authority will require the following conditions to be included in any Tender Documentation:

- Pump Station 6 shall be oversized as per the details relating to pump station 4 as submitted and no emergency overflow pipes into adjacent streams or drains shall be permitted. Full details shall be submitted for agreement prior to the commencement of any development on site.
- Access shall be provided to facilitate sampling by authorised persons.
- A permission in this instance will not pre-empt a permission pertaining to adjoining lands as indicated in original submission.

Reason: In the interests of the proper planning and development of the area, the visual amenities of the area and the environmental protection of the area.

4. **Scarriff Development:**

a) The proposed reservoir at the Scarriff site shall be sealed such that ingress from sub-surface elements into the water supply shall not be permitted.

A row of deciduous trees of native species shall be planted on the inside line of the proposed security fencing. These shall be planted along the full extent of the north and west boundaries and in informal clusters along the southern perimeter of the reservoir.

Mise le Meas,

MARIE O NEILL,
SNR. STAFF OFFICER,
PLANNING SECTION.

Attachment B.8

Site Notice

Site Notice

APPLICATION TO THE ENVIRONMENTAL PROTECTION AGENCY FOR A WASTE WATER DISCHARGE LICENCE UNDER THE WASTE WATER DISCHARGE (AUTHORISATION) REGULATIONS 2007.

The applicant, Clare County Council, New Road, Ennis, County Clare, intends applying to the Environmental Protection Agency for a wastewater discharge licence under the above named regulations.

The wastewater treatment plant associated with the application, Quilty Wastewater Treatment Plant, is located in the Townland of Tromracastle, Quilty, County Clare. The National Grid reference for the wastewater treatment plant is E100363; N173396.

The Quilty Wastewater Treatment process comprises of a sequencing batch reactor (SBR) plant with pretreatment by screening, storm overflow interception and UV disinfection of the final effluent. The final effluent from the domestic wastewater treatment plant discharges via an outfall pipe with associated diffuser to coastal waters approximately 350 meters offshore to the northeast of Seafield Quay. The National Grid Reference for the Primary Discharge Point P(SW1) at the end of the outfall pipe is E100590; N174540.

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, in such a format as may be determined by the Environmental Protection Agency, shall, as soon as is practicable after receipt by the Agency, be available for inspection or purchase at the headquarters of the Agency and at the principal office of Clare County Council, the relevant water services authority for this application.

Submissions in relation to the application may be made to the Agency at its headquarters at the EPA, Office of Climate, Licensing and Resource Use, PO Box 3000, Johnstown Castle Estate, Wexford, Tel: 053 916 0600 and Fax: 053 916 0699.

Signed:

Clare County Council,
Environment and Water Services,
Áras Chontae an Chláir,
New Road,
Ennis,
Co. Clare.

"Insertion in Clare Champion": 22nd June 2012

Attachment B.8

Newspaper Notice

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Signed:

Clare County Council,
Environment and Water Services,
Áras Chontae an Chláir,
New Road,
Ennis,
Co. Clare.

"Insertion in Clare Champion": 28th June 2012

Attachment B.9(i)

Population Equivalent of Agglomeration:

Population Equivalent of Agglomeration:

The design capacity for the plant is 1,365 population equivalent (PE) by 2025. At the time of planning for the new plant in 2004, the estimated existing PE for the area was calculated as 1,109 PE. This calculation includes an increase in population due to seasonal variation in summer, as the estimated winter population is calculated at 450PE. The design data for the WWTP is summarized in Table 1 hereunder:

Table 1: Design data for Kilmurry Ibrickane WWTP

Population Equivalent	1,365
Average Design Flow	3.6 l/s
Peak flow to treatment	10.7 l/s
BOD_5 Load	81.9 kg/day

BOD Loading:

When flow data to the WWTP for the period June 2011 to March 2012 inclusive, was examined, the average flow value arriving at the treatment works was calculated as 138m^3/day. The average BOD of the influent is 76mg O_2/litre. This equates to a population equivalent for this loading of 175 PE. The approach to estimation of population equivalent is in accordance with the definition provided in the Waste Water Discharge (Authorisation) Regulations, 2007 (*"population equivalent" is a measurement of organic biodegradable load and a population equivalent of 1 (1 p.e.) means the organic biodegradable load having a five-day biochemical oxygen demand (BOD_5) of 60g of oxygen per day; the load being calculated on the basis of the maximum average weekly load entering the waste water works during the year, excluding unusual situations such as those due to heavy rain*).

Hydraulic Load:

Using the average flow for the period June 2011 to March 2012, the total hydraulic load arriving at the WWTP is calculated as a population equivalent of 613 PE.

The WWTP was commissioned in September 2011. The existing BOD loading to the WWTP as calculated over the period June 2011 to March 2012 provides scope for increases in the loading to the plant from developments within the agglomeration area, which have not yet been connected to the sewer network.

Details of planning permissions granted since 2005 within the agglomerations area, which have not yet commenced and which are due to be connected to the sewer network are provided in Attachment B.9(ii) to this application.

Attachment B.9(ii)

Pending Development:

Details of planning permissions granted since 2005 within the agglomerations area, which have not yet commenced and which will be connected to the sewer network are provided in Table 1 hereunder:

Table 1 Details of planning permissions granted since 2005

Ref	Name	Address	Comment	PE[1]
05/2363	Laura O'Dwyer	Seafield	1 hse	2.9
06/710	Martin O'Connor	Quilty West	1 hse	2.9
06/1614	David Madigan	23 Sea View Park	1 hse	2.9
07/2885	Martin O'Connor	Quilty	1 hse	2.9
08/246	Dr Patrick O'Reilly	Finnor Mor	1 hse	2.9
08/1151	John & Mary O'Brien	Carrowlagan	12 hses	34.8
08/1216	Kevin Power	Quilty west	1 hse	2.9
08/1536	Fiona O'Boyle	Seafield	1 hse	2.9
08/1831	Austin Boyle	Quilty West	1 hse	2.9
08/8018	Clare County Council	Seaview Park Quilty	27 hses	78.3
09/139	Jer & Beatrice O'Riordan	Quilty West	1 hse	2.9
10/342	Kilmurry Ibrickane Community Centre Committee	Carrowlagan	30-60 people/d	20
10/461	Caitriona Dwyer	Seafield	1 hse	2.9
10/449	Patrick Clancy	Tromracastle	1 hse	2.9
10/607	John O'Boyle	Quilty	2 apartments	3
10/682	Kenneth O'Boyle	Quilty West	1 hse	2.9
10/735	Geraldine O'Boyle	Quilty West	1 hse	2.9
11/4	Kilmurry Ibrickane Sports Development Committee	Quilty West	50 people/d	16.6
11/109	Patrick McGannon	Quilty West	1 hse	2.9
11/288	Dorothy & Thomas Murrihy	Seafield	2 hses	5.8
11/291	Niamh McCarthy	Tromracastle	1 hse	2.9
11/293	P. O'Dwyer	Tromra East	1 hse	2.9
		Total		**205**

[1] Population equivalent calculated as 2.9 per house; 1.5 per apartment unit; Table 3 Recommended Wastewater Loading Rates from Commercial Premises *EPA Wastewater Treatment Manuals;*

MEMORANDUM OF AGREEMENT made the 25th day of August 2006, BETWEEN THE MINISTER FOR MINISTER FOR COMMUNICATIONS, MARINE AND NATURAL RESOURCES of Leeson Lane, Dublin 2, in the City of Dublin, (hereinafter called "the Minister" which expression shall include his Successors or Assigns where the contract so requires or admits),of the One Part and CLARE COUNTY COUNCIL (hereinafter called "the Licensee"),of the Other Part.

WHEREAS the Licensee has applied to the Minister for a Licence to use and occupy that part of the Foreshore described in the First Schedule hereto (hereinafter called "the Scheduled Property."), for the purpose as set out in the Second Schedule hereto (hereinafter called "the Development").

AND WHEREAS the Minister, in exercise of the powers vested in him by Section 3 of the Foreshore Act,1933, as amended by Section 2 of the Foreshore (Amendment) Act, 1992, hereby grants to the Licensee Licence to use and occupy the said Scheduled Property on the terms and conditions following:-

1. This Licence shall remain in force for the term of 35 years from the date hereof except as hereinafter provided.
2. The Licensee shall comply with the Site Specific requirements stipulated by the Minister as set out in the Third Schedule hereto.
3. The Licensee shall pay to the Minister the sum of €21387.50 (twenty one thousand three hundred and eighty seven euros and fifty cents) on the execution hereof (receipt of which is hereby acknowledged) and the annual sum of €1 (one euro) if demanded and thereafter any additional sum that may be imposed as hereinafter provided, such payments to be made on the first day of January in every year during the continuance of this Licence the first of such payments to be made on the signing hereof.

4. The Development shall be placed, maintained and constructed in accordance with the plans which have been submitted to, and approved by the Minister.

5. The Licensee shall use that part of the Scheduled Property, the subject matter of this Licence, for the purpose of said Development and for no other purpose thereof.

6. The Licensee shall, at all times during the continuance of this Licence, keep the said Development in a good and proper state of repair and condition to the satisfaction of the Minister and ensure that it will not be injurious to navigation, the adjacent lands or the public interest.

7. The Licensee shall indemnify and keep indemnified the State and the Minister, their Officers, Agents and Employees against all actions, loss, claims, damages, costs, expenses and demands, arising in any manner whatsoever in connection with the construction maintenance or use of the said Development or in the exercise of the permission hereby granted.

8. The Minister shall be at liberty at any time to terminate this Licence by giving to the Licensee three months notice in writing ending on any day, and upon determination of such notice, the Licence and permission hereby granted shall be deemed to be revoked and withdrawn without the liability for the payment of any compensation by the Minister to the Licensee.

9. The Licensee, shall, if so required by the Minister, within twelve months after receipt of such notice, or on determination of this Licence from any other cause, at its own expense remove the said Development to the satisfaction of the Minister, and, if the Licensee refuses or fails to do so, the Minister may cause the said Development to be removed and shall be entitled to be paid by and to recover from the Licensee as a civil debt due to the State all costs and expenses incurred by him in connection with such removal and restoration.

10. In the event of the breach, non-performance or non-observance by the Licensee of any of the conditions herein contained, the Minister may forthwith terminate this Licence without prior notice to the Licensee.

11. Any notice to be given by the Minister may be transmitted through the Post Office addressed to the Licensee at its last known address.

12. The benefit of this Licence is personal to the Licensee and not assignable and the rights given hereunder may only be exercised by the Licensee.

AND IT IS HEREBY CERTIFIED THAT:

1. For the purpose of the stamping of this Instrument that this is an Instrument to which the provisions of Section 53 of the Finance Act 1999, do not apply for the reason that the entire of the Scheduled Property involved comprises Foreshore and contain no Buildings.

2. The Family Law Acts of 1976, 1981, 1989, 1995 and the Family Law (Divorce) Act, 1996, do not affect the Property.

FIRST SCHEDULE

ALL THAT AND THOSE an area of foreshore at Baurnagross, Quilty in the County of Clare more particularly described and delineated in red on the map annexed hereto.

SECOND SCHEDULE

Laying, using and maintaining an outfall pipe and associated diffuser from a wastewater treatment plant in connection with Quilty Sewerage Scheme.

THIRD SCHEDULE

Quilty Sewerage Scheme – MS51/11/216
Specific Conditions

1

(a) The Licensee shall use that part of the foreshore, the subject matter of this Licence, for the purpose of constructing, using and maintaining the aforementioned outfall pipe and diffuser in accordance with the plans and drawings submitted to and approved by the Minister for Communications, Marine and Natural Resources and for no other purpose whatsoever.

(b) The Licensee may also use the adjacent foreshore but only to the extent necessary, and in compliance with condition 3 (a), for the purpose of constructing and maintaining the said outfall pipe and diffuser and shall restore the said foreshore to its proper condition immediately after such use.

2 The Licensee shall provide certification by a Chartered Engineer -

(a) prior to the commencement of any works on the foreshore, stating that the works have been designed in accordance with the relevant Irish or British Standard Specifications or Codes of Practice for strength, stability and durability, taking into account building regulations and safety legislation, and

(b) within two months after completion of the said works, stating that the said works have been completed in accordance with the drawings* approved of by the Licensor and with the said Standard Specifications or Codes of Practice.

* Drawing Number 20281/FL/03 as prepared by Nicholas O'Dwyer Limited – Consulting Engineers on behalf of the Licensee.

3 The Licensee shall comply with conditions (a) to (j) below, as stipulated by the Heritage and Planning Division of the Department of the Environment, Heritage and Local Government. The Licensee shall comply with any instructions of the Heritage and Planning Division in relation to the implementation of these conditions.

(a) The works area on the foreshore may extend no more than 5 metres either side of the pipeline trench. The site may only be accessed within the 10 metre foreshore works corridor.

(b) If a ramp needs to be installed to gain access to the works area, a geotextile membrane should be laid to facilitate the full subsequent removal of ramp material.

(c) No storage of fill or excavated material (temporary or otherwise) may take place on the foreshore. Excavated material must be removed and dumped at an appropriately licensed facility.

(d) No storage of chemicals or oil-based material may take place on the foreshore. Storage of chemicals or oil-based material may only take place at a suitably bunded location outside the foreshore.

(e) No refuelling may take place on the foreshore. Refuelling activities may only take place at a suitably bunded location outside the foreshore.

(f) All machinery must be regularly checked as to its state of repair to prevent any contamination of foreshore by fuel, antifoulants, etc.

(g) Minor/major spillage response procedures shall be established prior to commencement of works and all personnel on site must be familiar with the implementation of these procedures.

(h) Materials must not be gathered from the foreshore for the works.

(i) Rock to weigh down the pipeline must be placed accurately, to the satisfaction of the Heritage and Planning Division of the Department of the Environment, Heritage and Local Government.

(j) In the interests of the safety of marine mammals the Licensee shall ensure that:

(i) A pup survey by a suitably qualified marine mammal expert is undertaken prior to commencement of the blasting phase. If 10 or more pups are sighted, further measures other than those outlined below should be undertaken in consultation with the National Parks and Wildlife Section (NPWS) of the Department of the Environment, Heritage and Local Government.

(ii) Details of the proposed dates, location, number and weight of blasting charges are provided to NPWS and to the marine mammal expert at least 6 weeks prior to blasting activities.

(iii) The duration of blasting is minimised. A series of small explosions should be undertaken rather than fewer larger explosions.

(iv) Only minimum quantities of explosives are used, to a maximum source sound level of 150 dB re. 1UPa.

(v) Any explosive charges are placed within a borehole drilled into the substratum to be removed.

(vi) The use of explosives during the development is confined to a daytime period when weather conditions do not exceed Beaufort Sea State 3 within this European Site.

(vii) A designated NPWS Officer, in liaison with the marine mammal expert, is consulted no more than one hour before scheduled blasting in order to determine if sufficient lighting exists to facilitate effective visual monitoring for mammals. In the event of insufficient lighting blasting will be terminated until acceptable light conditions prevail.

(viii) Any blasting occurs within 30 minutes of Low Water and, if possible, is scheduled to take place during Spring Tides.

(ix) No blasting takes place before the marine mammal expert has conducted preparatory visual monitoring of 1.5 hours duration. Acoustic monitoring for cetaceans should also be undertaken in parallel with visual monitoring.

(x) Blasting does not occur if marine mammals are present within the area. Blasting shall not recommence until at least 30 minutes have elapsed with no mammal reports by the marine mammal expert.

(xi) A clear on-site, communication signal is agreed between the designated NPWS Officer and the Works Superintendent as to whether blasting may or may not proceed. Charges may only be triggered on positive confirmation with the designated NPWS Officer who will be liasing with the marine mammal expert.

4 The Licensee shall ensure that archaeological monitoring is carried out during excavation/disturbance works to the foreshore, associated with the installation of the outfall pipe. Archaeological monitoring shall consist of the following:

(a) The Licensee shall engage a qualified archaeologist to monitor all groundworks, including dredging operations, associated with the development. The archaeologist must be licensed under the National Monuments Acts 1930-1994.

(b) Should archaeological material be found during the course of monitoring, the archaeologist may have work on the site stopped, pending a decision as to how best to deal with the archaeological material. The developer shall be advised by the Underwater Archaeology Unit of the Department of the Environment, Heritage and Local Government with regard to any necessary mitigation action (e.g. preservation in situ, dive and/or geophysical survey or excavation). The Licensee shall facilitate the archaeologist in recording any material found.

(c) The National Monuments Section and the Underwater Archaeology Unit of the Department of the Environment, Heritage and Local Government shall be furnished with a report describing the results of the monitoring.

5 The effluent discharged from the treatment plant outfall pipe shall have a maximum 5-day B.O.D. concentration of 25 mg/l and a maximum suspended solids concentration of 35 mg/l. 95% of samples shall comply with these standards. The BOD loading discharged per day shall not exceed 35 kg.

6

(a) The effluent from the Waste Water Treatment Plant shall be sampled weekly immediately downstream from the plant and immediately prior to discharge. These samples shall be tested for faecal coliform content, for 5-day BOD and for suspended solids concentration. The frequency may be reduced to monthly after six months compliance with Condition 5.

(b) A sampling programme to monitor the quality of storm overflows shall be agreed with the Department of Communications, Marine & Natural Resources before the scheme comes into operation.

(c) A report on the operation of the treatment plant and compliance with these discharge conditions, including the results of the sample analyses above, shall be submitted to the Coastal Zone Management Division of the Department of Communications Marine & Natural Resources annually.

(d) Should sample analysis indicate that the plant is not operating to design specifications the Licensee shall inform the Coastal Zone Management Division of the Department of Communications Marine & Natural Resources immediately.

(e) The analyses shall be carried out in an accredited laboratory by an approved methodology.

(f) The cost of all the aforementioned sampling and monitoring shall be borne by the Licensee.

7. The Licensee shall make provision for further treatment of the effluent should this be proved necessary by the Licensor to ensure compliance with the Shellfish Waters Directive or the Bathing Waters Directive should receiving waters be designated under either directive.

8. The Licensee shall consult with the Department of Communications, Marine & Natural Resources at all stages of the works on the foreshore. Methods and scheduling of construction on the foreshore shall be as agreed with the Department and shall comply with Condition 3.

9

9. The Licensee shall ensure that the works are carried out in accordance with applicable environmental laws.

10. All works shall be completed within five years of the granting of this Licence.

11. The Licensee shall notify the Irish Coast Guard by telephone immediately at (01) 6782301 or (01) 6782302 in the event of any spillage or accident occurring below the high water mark of ordinary or medium tides or above the high water mark which may impact on the foreshore during the carrying out of the works, or during operations following the completion of these works.

12 The Licensee shall ensure that the outfall pipe is adequately marked for navigation and shall apply to the Commissioners of Irish Lights for sanction of new navigational aids/buoyage and/or alteration of existing navigational aids/buoyage.

13 In order for charts and nautical publications to be updated the Licensee shall inform the British Admiralty Hydrographic Office of the nature and location of the proposed works

14 The Licensee shall arrange for the publication of a local marine notice giving a general description of operations and approximate dates of commencement and completion.

15 The Licensee shall ensure that the area excavated for the outfall pipe is fully reinstated to its pre-excavation state and level after pipeline installation. This applies to both inter-tidal and sub-tidal sections of the route.

16 The Licensee shall ensure that no material or debris remains at the site following completion of the construction works.

17 The Licensee shall agree a programme of maintenance of the pipeline and diffuser with the Department of Communications, Marine & Natural Resources prior to construction.

18 The Licensee shall, at all times during the continuance of this Licence, keep the said structures in a good and proper state of repair and condition to the satisfaction of the Licensor and ensure that they are not injurious to navigation, fisheries, the adjacent lands or the public interest.

19 The Licensor shall be at liberty at any time to terminate this Licence by giving to the Licensee three months previous notice in writing, ending on any day and upon determination of such notice, the Licence and permission hereby granted shall be deemed to be revoked and withdrawn without liability for the payment of any compensation by the Licensor to the Licensee.

20 The Licensee shall if so required by the Licensor within twelve months after receipt of such notice or on determination of this Licence from any other cause at its own expense, remove the said structures and restore the foreshore in question to the satisfaction of the Licensor and if the Licensee refuses or fails to do so, the Licensor may cause the said works to be removed and the foreshore in question restored and shall be entitled to be paid by and to recover from the Licensee, as a civil debt due to the State, all costs and expenses incurred by him in connection with such removal and restoration.

21 In the event of the breach, non-performance or non-observance by the Licensee of any of the conditions herein contained, the Licensor may forthwith terminate this Licence without prior notice to the Licensee.

22 The Licensor reserves the right to review and amend the terms of this Licence based on the results of any monitoring programme or other relevant information that becomes available.

IN WITNESS whereof the Licensor has caused his seal of Office to be hereunto affixed and the Common Seal of the Licensee has been affixed hereto the day and year first above WRITTEN.

PRESENT when the Seal of
Office of the **MINISTER FOR COMMUNICATIONS, MARINE AND NATURAL RESOURCES,** was affixed and was authenticated by the signature of: John Quinlan

A person authorised under Section 15(1) of the Ministers and Secretaries Act, 1924, to authenticate the seal of the Minister.

WITNESS: Mary Flynn

ADDRESS: Dept Comms, Marine + Nat Resources

OCCUPATION: Civil Servant

PRESENT when the Common Seal of the Licensee was affixed hereto:

)
)
)
)
)
)
)
)
)
)
)

TOM CAREY DS – COUNTY ENGINEER

Dated this 25th day of August 2006

THE MINISTER FOR COMMUNICATIONS,
MARINE AND NATURAL RESOURCES

One part

-WITH-

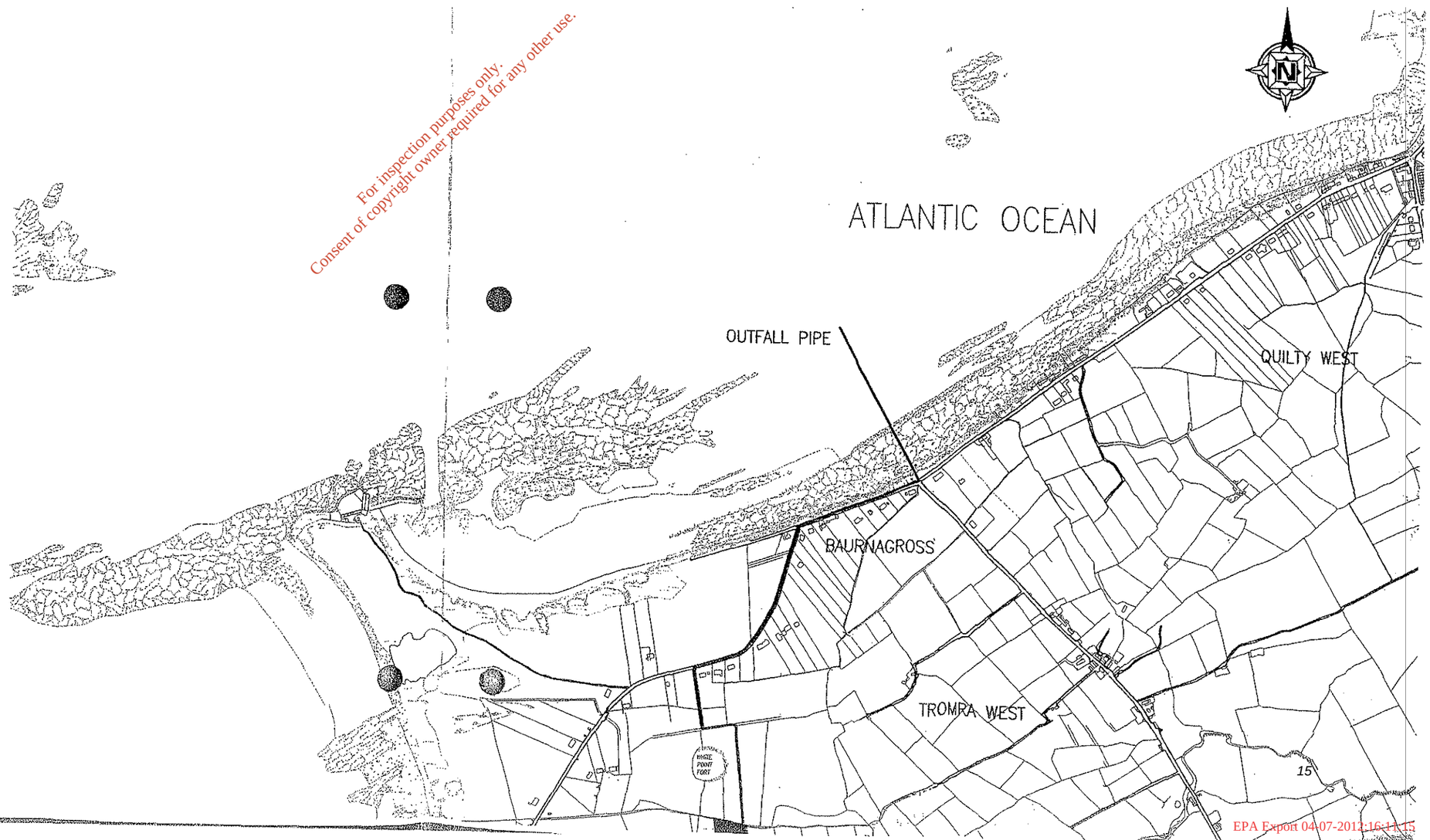
CLARE COUNTY COUNCIL

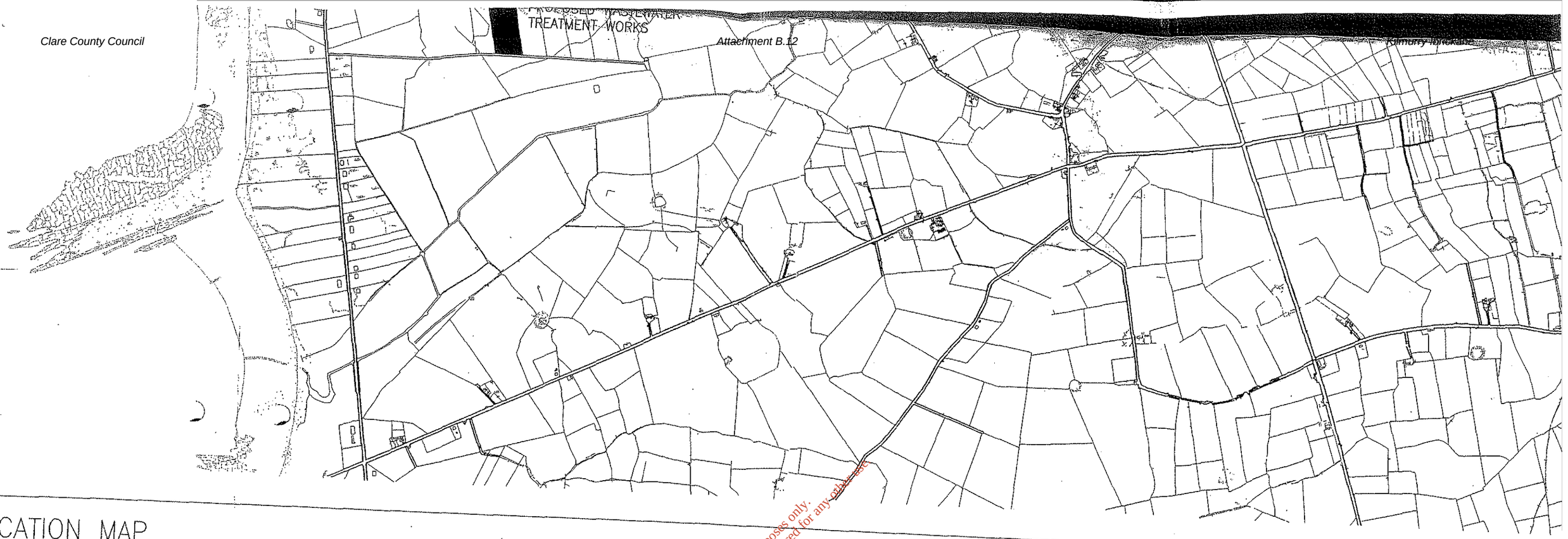
Second Part

FORESHORE LICENCE

Certified a true copy
Michael Houlihan & Partners
Solicitors
9/10/11 Bindon Street,
Ennis. Co Clare

DAVID J. O'HAGAN
CHIEF STATE SOLICITOR,
OSMOND HOUSE,
LITTLE SHIP STREET,
DUBLIN 8.
Ref: /AOL/9662/2005





LOCATION MAP

Attachment C.1

Description of Infrastructure and Operation of WWTP and Pump Stations serving the Kilmurry Ibrickane Agglomeration

Description of WWTP serving Kilmurry Ibrickane Agglomeration

The WWTP serving the Kilmurry Ibrickane agglomeration was constructed in 2010, commissioned in September 2011, and is located in the townland of Tromracastle to the southwest of Quilty and west of Mullagh. Effluent from the plant discharges to coastal waters approximately 350 meters offshore to the northeast of Seafield Quay. The National Grid Reference for the Primary Discharge Point P(SW1) at the end of the outfall pipe is E100595; N174540. A map indicating the location of the agglomeration and WWTP site is provided as Attachment B.1. Details of the site layout are provided in Attachment B.2.

1 Wastewater Flows

The design capacity for the plant is 1,365 population equivalent (PE) by 2025. At the time of planning in 2004, the estimated existing PE for the area was calculated as 1,109 PE. This calculation includes the increase in population due to seasonal variation in summer, as the estimated winter population is calculated at 450PE. Details of the design data and loadings arriving at the WWTP and the population equivalent are provided in Attachment B.9(i) to this application.

2 Treatment Process Description

The new WWTP design is based on a sequencing batch reactor (SBR) plant with pretreatment, by screening, and storm overflow interception. See flow diagram below. The facility consists of the following elements:

- Inlet screening, fitted with coarse and fine screens, flow activated and equipped with a collection bin for inorganic screenings.*
- Splitter chamber.*
- Grit Separator with overflow to storm holding tank.*
- Inlet buffer tank.
- Sequencing Batch Reactor, operated on a six cycle rotation
- Ultraviolet disinfection of the final effluent.
- Inflow and outflow monitoring (including storm overflow).
- Sludge storage facility.
- Administration Control house.

*All linked to a carbon filter for odour control.

Sludge is drawn from the SBR tank during the decant cycle and stored on site in a sludge storage tank, with removal of sludge off site for further processing

There is no storm overflow facility provided within the sewer network serving Kilmurry Ibrickane. During storm events the excess flow to the plant is diverted to the storm tank for temporary storage before being returned to the inlet flow point once normal flows to the plant resume.

Pumping Station Information

There are six pump stations associated with the Kilmurry Ibrickane sewer network, which convey foul wastewaters under gravity conditions to pump stations and from there to the WWTP. The design details for the individual pump stations are outlined below. It is noted that all pumps are designed to exceed the contract requirements while maintaining self cleansing velocities in the rising main.
The location of the pump stations are detailed in Table 1 below: A map showing the locations of the pump stations is provided in Attachment B.1.

Table 1

No.	Location	Ref	Grid reference
1	On Miltown Malbay road in Quilty	PS No.1	102014E; 175118N;
2	On Kilmurry Road in Baurngross, Quilty	PS No.2	100710E; 174081N;
3	Adjacent to main in Seafield	PS No.3	100068E; 173697N;
4	Adjacent to main in Tromracastle Quilty	PS No.4	99787E; 172819N;
5	Adjacent to main in Rineroe, Quilty	PS No.5	105094E; 173489N;
6	East of Mullagh Village	PS No.6	105094E; 173045N;

1. On Miltown Malbay road in Quilty

- Pump station forward feed to gravity line feeding pump station No.2 on the Kilmurry Road in Baurngross, Quilty.
- 3.0m Deep TOP 100 Tank Flygt TOP100S.
- 2no Flygt Submersible Sewage Pumps Flygt NP 3102 SH with 4.2kW motor operating on a duty/standby basis.
- High/low level float switch to forward pump.
- High Level Alarm Unit with battery back up to permit operation in the event of electrical failure.
- 317m 100mm diameter HDPE Rising Main.
- Scada Radio link to treatment plant control for warning signals.

2. On Kilmurry Road in Baurngross, Quilty

- Pump station forward feed to treatment plant at Tromracastle, Quilty
- 1277m 200mm diameter HDPE Rising Main

3. Adjacent to main in Seafield

- Pump station forward feed to treatment plant at Tromracastle, Quilty
- 713m 100mm diameter HDPE Rising Main

4. Adjacent to main in Tromracastle Quilty

- Pumpstation forward feed to gravity line feeding pump station No.3 on the Seafield, Quilty.
- 3.0m Deep TOP 100 Tank Flygt TOP100S.
- 2 no. Flygt Submersible Sewage Pumps Flygt NP 3102.090 256 “N” Impeller with 4.2kW motor.
- Pumps operating on a duty/standby basis delivering a flow of 15.0l/s.
- 737m 100mm diameter HDPE Rising Main.

- Back up power supply 16kW continuous Generator to BS 551 fitted with a 20kVA alternator to allow for harmonics generated by fixed speed drives on time delay during mains power outage.
- High Level Alarm Unit with battery back up to permit operation in the event of electrical failure.
- Hydro Ranger 200 Ultrasonic level controller fitted which provides control, differential control and open channel flow monitoring.
- Scads Radio link to treatment plant control for warning signals and wet well level.
- Volume of Pumping Station wet well 26.5m^3. There is also an additional storage capacity within the pipe network of 19m³.

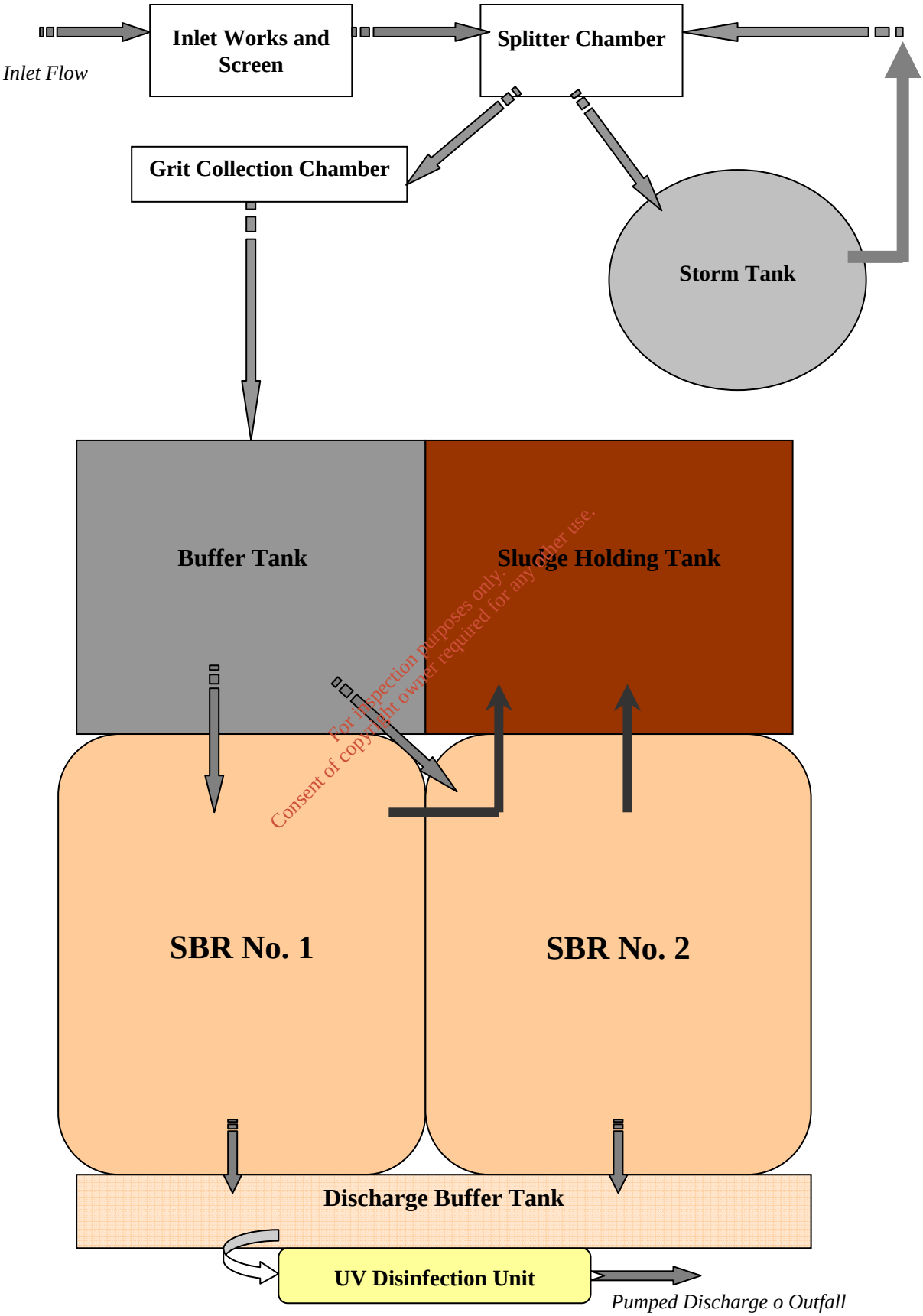
5. Adjacent to main in Rineroe, Quilty

- Pump station forward feed to gravity line feeding pump station No.2 on the Kilmurry Road in Baurngross, Quilty.
- 3.0m Deep TOP 100 Tank Flight TOP100S
- 2 no. Flight Submersible Sewage Pumps Flight NP 3153.091 275 "N" Impeller with 11.0kW motor.
- Pumps operating on a duty/standby basis delivering a flow of 15.0l/s.
- 358m 100mm diameter HDPE Rising Main.
- Back up power supply16kW continuous Generator to BS 551 fitted with a 20kVA alternator to allow for harmonics generated by fixed speed drives on time delay during mains power outage.
- Hydro Ranger 200 Ultrasonic level controller fitted which provides control, differential control and open channel flow monitoring.
- Scads Radio link to treatment plant control for warning signals and wet well level.
- Volume of Pumping Station wet well is 59.3m^3. There is also an additional storage capacity in the pipe network feeding into the pump station of approx 5m³.

6. East of Mullagh Village

- Pump station forward feed to gravity line feeding pump station No.5 on the Reenrol, Quilt.
- 3.0m Deep TOP 100 Tank Flight TOP100S.
- 2 no. Flight Submersible Sewage Pumps Flight NP 3153.091 273 "N" Impeller with 15.0kW motor.
- Pumps operating on a duty/standby basis delivering a flow of 18.0l/s.
- 1,148m 150mm diameter HDPE Rising Main.
- Back up power supply 16kW continuous Generator to BS 551 fitted with a 60kVA alternator to allow for harmonics generated by fixed speed drives on time delay during mains power outage.
- Hydro Ranger 200 Ultrasonic level controller fitted which provides control, differential control and open channel flow monitoring.
- Scads Radio link to treatment plant control for warning signals and wet well level.
- Volume of Pumping Station wet well is 45.3m^3. There is also additional storage capacity in the pipe network feeding into the pump station of approx 7.5m³.

Flow Diagram for Waste Water Treatment Plant



Attachment C.2

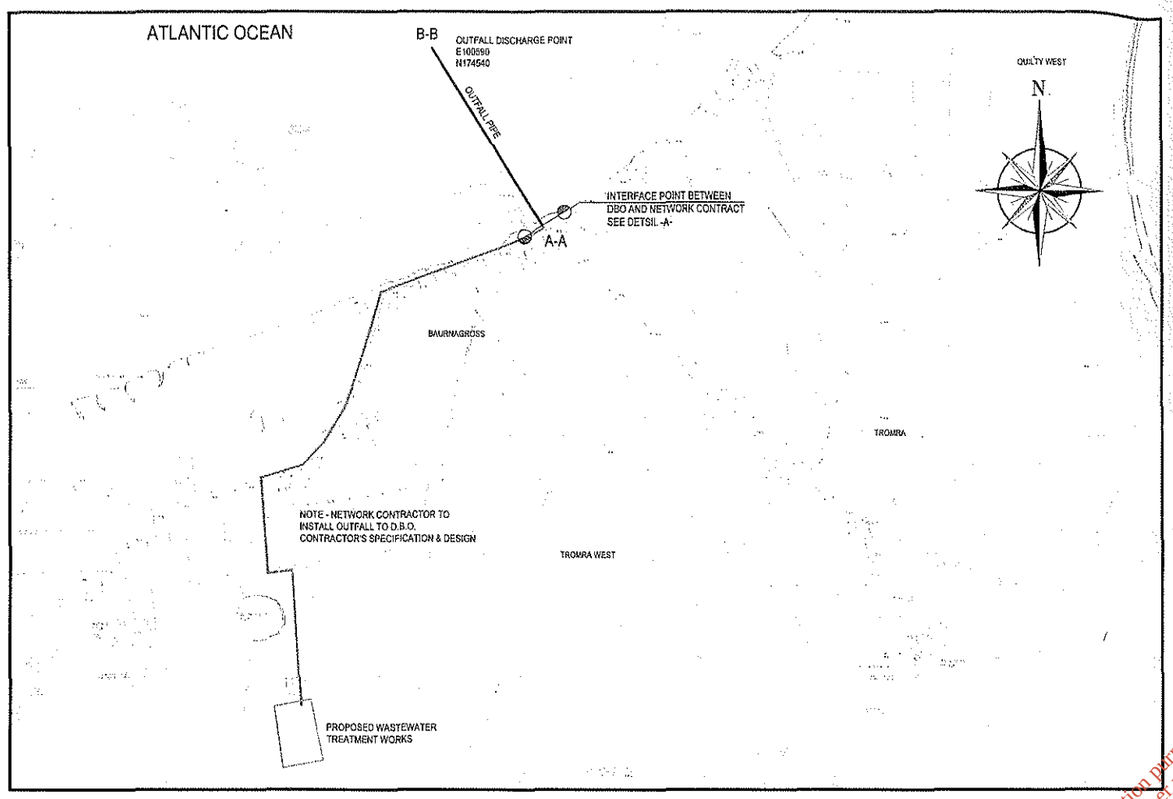
Outfall Design and Construction for Quilty Discharge

Outfall Design and Construction

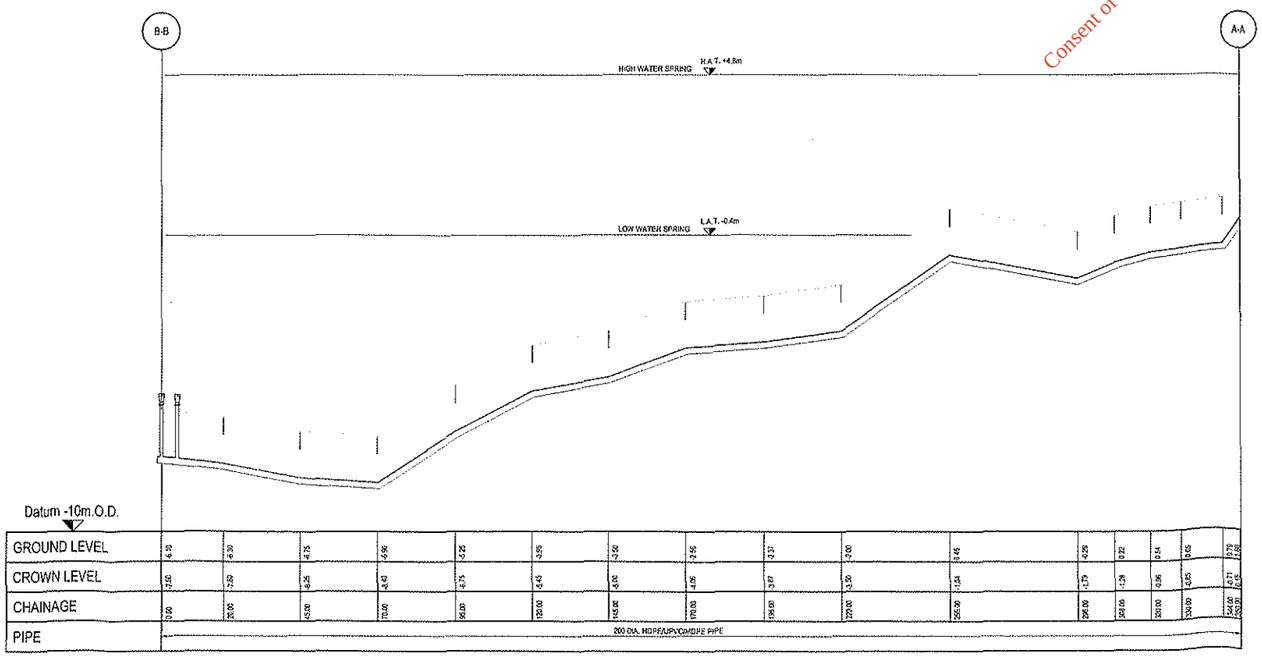
In accordance with the Foreshore Act, 1933, a licence was granted in August 2006, by the Minister of Communications, Marine and Natural Resources, permitting "*the laying, using and maintaining an outfall pipe and associated diffuser from a wastewater treatment plant in connection with Quilty sewerage scheme*." A copy of the licences is provided in Attachment B.12.

The treated effluent from the wastewater treatment plant discharges via a diffuser outfall pipe to the coastal waters, named the Shannon Plume Code: IE_SH_070_0000. The discharge point is located approximately 350m offshore. The drawings below details the diffuser outfall arrangements.

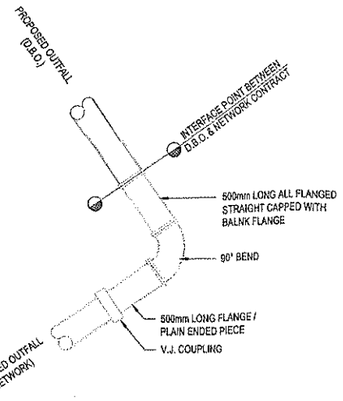
The treated wastewater discharge is the primary discharge, and is designated SW1 on the map accompanying this application as provided in Attachment B.1. The grid reference for the final discharge point is N100595; E174540.



PLAN OF OUTFALL ROUTE
SCALE 1/1000

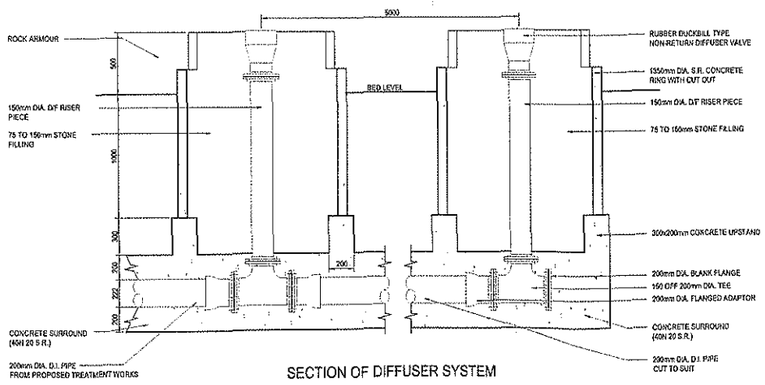


OUTFALL LONGITUDINAL SECTION
SCALE HOR 1/1000, VERT 1/100

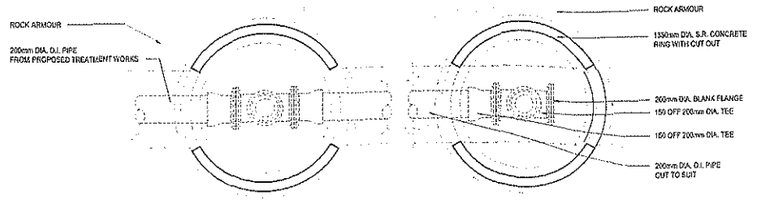


NOTE - EXACT POSITION ON THE ROAD TO BE DETERMINED BY THE NETWORK CONTRACTOR

DETAIL -A- INTERFACE PIPEWORK
N.T.S



SECTION OF DIFFUSER SYSTEM



PLAN OF DIFFUSER SYSTEM

DIFFUSER DETAILS AT POINT B-B
SCALE 1/25

NOTES.

LEGEND

PROPOSED TREATMENT WORKS SITE AND PUMPING STATION SITES

PROPOSED OUTFALL PIPELINE (NETWORK CONTRACT)

PROPOSED OUTFALL PIPELINE (D.B.O. CONTRACT)

INTERFACE POINT BETWEEN D.B.O. AND NETWORK CONTRACT

REV	DATE	DESCRIPTION	D	C	A
-	16.8.07	ISSUED FOR TENDER	D.S.	N.D.	N.D.
A	8.10.06	CLIENT'S COMMENTS INCORPORATED	D.S.	N.D.	N.D.

TENDER

Nicholas O'Dwyer
CONSULTING ENGINEERS
Nutgrove Office Park, Nutgrove Avenue, Dublin 14
Tel: 01-296 9600 Fax: 01-296 9691 E-mail: nodwyer@nicholasodwyer.com

CLIENT
CLARE COUNTY COUNCIL

PROJECT
FEAKLE, SCARRIFF & QUILTY SEWERAGE SCHEME

TITLE
QUILTY / MULLAGH
DETAILS OF OUTFALL AND D.B.O. INTERFACE

SCALES	DRAWN	CHECKED	APPROVED
AS SHOWN	D.Smithers	F.Lane	N.Delaney
	DATE 21.08.06	DATE 21.08.06	DATE 21.08.06

DRAWING No. 202816DY104 REV A

Attachment D.1

WWTP Monitoring Results June 2011 – March 2012

Table 1a Influent Monitoring Results June to December 2011

Date	BOD mg/l O_2	COD mg/l O_2	SS mg/l	TN mg/l N	TP mg/l P	NH_3 N mg/l
01/06/2011	112	256	55	36	3	15
09/06/2011	89	146	---	---	0.2	---
16/06/2011	82	95	---	---	1.51	---
23/06/2011	76	109	---	---	1.09	---
30/06/2011	61	171	---	---	4	---
08/07/2011	187	456	188	55	7.9	37.7
11/07/2011	98	179	---	---	1.71	---
19/07/2011	227	522	---	---	0.68	---
29/07/2011	222	480	---	---	1.14	---
02/08/2011	85	172	---	---	0.34	---
09/08/2011	134	600	109	7	0.02	---
16/08/2011	43	90	42	8	0.22	6.88
25/08/2011	53	106	---	---	0.24	---
31/08/2011	103	237	82.4	46	1.11	44.9
02/09/2011	311	739	72.4	41	1.1	48.3
09/09/2011	75	105	---	---	1.96	---
16/09/2011	68	---	---	---	2.1	---
22/09/2012	42	89	---	---	2.75	---
28/09/2011	48	109	---	---	4	---
06/10/2011	107	146	70	63	17.5	---
12/10/2011	75	189	---	---	6.25	---
19/10/2011	95	201	---	---	4.77	---
26/10/2011	120	321	---	---	5.89	---
01/11/2011	25	48	---	---	---	---
09/11/2011	54	118	6.6	60	1.89	---
16/11/2011	38	122	---	---	---	---
24/11/2011	63	103	---	---	---	---
01/12/2011	15	40	7	33	1.1	---
06/12/2011	2	30	---	---	0.5	---
Average	85.6	195	63.2	35	2.5	25.5

Table 1b Influent Monitoring Results January to March 2012

Date	BOD mg/l O_2	COD mg/l O_2	SS mg/l	TN mg/l N	TP mg/l P
03/01/2012	26	62	/	/	0.51
12/01/2012	13	28	36	30	0.61
19/01/2012	47	121	/	/	0.80
25/01/2012	14	72	/	/	2.80
01/02/2012	16	39	20	1	1.32
08/02/2012	21	67	/	/	3.52
15/02/2012	42	89	/	/	12.10
22/02/2012	77	246	/	/	5.90
29/02/2012	83	146	/	/	3.50
07/03/2012	65	127	79	40	1.38
14/03/2012	78	123	/	/	0.76
21/03/2012	83	170	/	/	1.50
28/03/2012	118	230	/	/	0.73
Average	**53**	**117**	**45**	**35**	**2.7**

Attachment E.1

Outlet Flow Records from WWTP

Outlet Flow Volumes from Quilty WWTP

Monitoring Period: June 2011 – March 2012

				2011				2012		
Day/Month	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
1	88	60	104	58	194	221	404	225	144	117
2	36	81	67	110	152	219	378	234	128	79
3	79	74	81	210	144	182	271	276	109	121
4	86	82	80	177	121	149	277	324	104	101
5	88	80	82	138	89	127	269	235	198	136
6	91	82	76	163	95	123	262	192	101	74
7	104	205	81	94	97	98	181	189	104	158
8	148	196	111	123	91	103	207	114	104	114
9	72	91	134	146	92	101	209	149	183	98
10	72	111	139	133	93	118	148	118	102	114
11	122	76	129	172	98	101	146	203	136	103
12	51	90	97	163	108	121	205	173	132	70
13	111	55	109	134	97	80	313	136	122	115
14	112	97	112	102	67	80	220	135	103	77
15	93	73	64	105	91	89	177	132	108	100
16	76	76	136	99	130	87	168	103	98	70
17	84	114	100	94	90	85	188	119	85	213
18	158	87	56	109	144	402	193	114	141	95
19	96	79	97	119	142	406	123	134	142	100
20	78	75	62	215	131	277	331	130	95	95
21	72	70	64	109	117	151	210	118	103	106
22	151	66	98	149	112	141	183	98	94	93
23	67	98	62	110	228	121	142	115	254	95
24	73	76	133	118	308	134	187	105	109	97
25	195	90	108	101	322	296	165	150	130	99
26	196	89	92	105	148	146	137	231	125	89
27	71	59	86	86	145	149	170	227	96	96
28	91	85	77	92	130	106	276	232	97	100
29	70	80	75	80	136	303	272	265	98	101
30	87	88	79	81	239	674	144	305		101
31		75	74		192		189	177		105

Attachment E.2

Monitoring Program for Emissions from the Quilty WWTP

Monitoring Program for Emissions from the Quilty WWTP

Provisions for monitoring emissions from the wastewater treatment plant are in place at the WWTP. The wastewater treatment plant is operated by Coffey Water, as the "operate" element of a Design-Build-Operate Contract. Monitoring of influent and effluent wastewater streams is undertaken on a monthly basis for the parameters biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS), Total nitrogen (TN), total phosphorus (TP) and Ammonia (NH_3-N). In addition bacterial analysis is carried out of the effluent after it has passed through the Ultraviolet Disinfection Unit on a monthly basis.

Samples are taken as 24 hour composite samples and the methods of analysis used are in accordance with Standard Methods for the Examination of Water and Wastewater. A contract laboratory is used for the parameter BOD.

There is no monitoring of the receiving waters undertaken at present. In the course of preparation of this application, Clare County Council has taken a sample of the receiving waters to assess the impact of the discharge. A map showing the location of the discharge point, P(SW1) and the ambient monitoring point, aSW1 is provided in Attachment B.1.

Attachment E.4

Quilty WWTP Monitoring Results June 2011 – March 2012

Table 1a Effluent Monitoring results June – December 2011

Date	BOD mg/l O_2	COD mg/l O_2	SS mg/l	TN mg/l N	TP mg/l P	NH_3 N mg/l
01/06/2011	5	12	3	8	1.23	5.6
09/06/2011	4	15	---	---	0.1	---
16/06/2011	14	57	---	---	1.27	---
23/06/2011	6	22	---	---	1.45	---
30/06/2011	3	16	---	---	1.33	---
08/07/2011	3	13	7	16	0.8	0.89
11/07/2011	4	24	---	---	0.86	---
19/07/2011	9	38	---	---	0.56	---
29/07/2011	3	41	---	---	0.81	---
02/08/2011	5	33	---	---	0.11	---
09/08/2011	3	16	19	3.9	0.01	---
16/08/2011	1	8	7	4	0.08	1.32
25/08/2011	9	27	---	---	0.08	---
31/08/2011	4	20	14.8	2	0.27	0.09
02/09/2011	4	21	18.4	6	1.08	0.14
09/09/2011	4	22	---	---	1.53	---
16/09/2011	3	---	18	---	1.8	---
22/09/2011	3	22	---	---	0.9	---
28/09/2011	3	18	---	---	2.8	---
06/10/2011	3	35	10	28	3.6	---
12/10/2011	3	23	---	---	1.5	---
19/10/2011	4	22	---	---	1.66	---
26/10/2011	6	25	---	---	2.01	---
01/11/2011	2	14	---	---	0.84	---
09/11/2011	3	44	11	36	0.06	---
16/11/2011	2	32	---	---	1.8	---
24/11/2011	3	19	---	---	0.39	---
01/12/2011	2	24	4	30	0.9	---
06/12/2011	1	2	---	---	0.39	---
14/12/2011	3	11	---	---	0.52	---
21/12/2011	1	8	---	---	0.06	---
28/12/2011	3	12	---	---	0.08	---
Average	**4**	**22**	**10**	**13**	**0.97**	**1.61**

Table 1b Effluent Monitoring Results January - March 2012

Date	BOD mg/l O_2	COD mg/l O_2	SS mg/l	TN mg/l N	TP mg/l P
03/01/2012	2	19	/	/	0.30
12/01/2012	2	18	2	27	0.44
19/01/2012	2	16	/	/	0.09
25/01/2012	3	28	/	/	0.70
01/02/2012	2	12	4	1	1.14
08/02/2012	2	23	/	/	0.14
15/02/2012	3	22	/	/	1.74
22/02/2012	1	15	/	/	0.36
29/02/2012	4	31	/	/	1.50
07/03/2012	3	20	13	23	1.38
14/03/2012	4	27	/	/	0.76
21/03/2012	3	26	/	/	1.50
28/03/2012	3	21	/	/	0.73
Average	**2.6**	**21**	**6**	**25**	**0.83**

Attachment F.1

Impact on Receiving Water

Impact of emissions from the WWTP serving the Kilmurry Ibrickane agglomeration on the receiving waters.

The impact of discharges from the Quilty WWTP on the receiving waters of the Shannon Plume Code: IE_SH_070_0000 is considered under a number of headings:

1. Description of receiving waters
2. Assessment of impact of the discharge on the receiving waters
3. Measures undertaken to ensure the discharge will not significantly impact on pathogen numbers in the receiving waters
4. Assessment of the discharge on the receiving waters
5. Assimilative capacity of the receiving waters
6. Statutory Designations of the Receiving Waters

1. Description of the Receiving Waters

The discharge from the WWTP serving the Kilmurry Ibricane agglomeration drains into the coastal waters the Shannon Plume Code: IE_SH_070_0000. The waterbody covers an area of 379km^2 and stretches from the mouth of the Shannon estuary in the south, along the County Clare coastline to Black Head to the north. A quality status has not been assigned to this waterbody, however the Water Framework Directive (WFD) 2000/60/EC, includes the objective of attaining good status in water bodies that are of lesser status at present and retaining good status or better where such status exists at present. The full report for the waterbody Shannon Plume is provided as Attachment F.1.1.

2. Assessment of Impact of the discharge on the receiving waters

There is no monitoring of the receiving waters undertaken at present. However Clare County Council, during the course of preparing the application to the EPA for a discharge authorisation**,** under the *Wastewater Discharge (Authorisation) Regulations 2007, (S.I No 684 of 2007)* for the WWTWP serving the Kilmurry Ibrickane agglomeration, carried out monitoring of the effluent discharge from the WWTP and the receiving waters in the vicinity of the discharge point. Monitoring was undertaken in May 2012 and the results of the monitoring do not indicate that the discharge is impacting on the receiving waters.

The agglomeration area was also assessed to identify any facility liable to generate substances listed in Annex X of the Water Framework Directive (2000/60/EC) or relevant pollutants listed in Annex VIII of the Water Framework Directive. The results of the monitoring do not indicate any substance on the list was present in the receiving waters or in the discharges from the WWTP (see Annex 1). No potential source of these pollutants has been identified in the sewer catchment, so it is unlikely that the discharge will contain any of the listed substances.

3. Measures undertaken to ensure the discharge will not significantly impact on pathogen numbers in the receiving waters.

To eliminate any significant impact on the receiving waters from faecal coliform, salmonella and protozoan pathogen numbers, the final effluent is passed through an Ultraviolet disinfection unit at the end of the treatment process before discharge to the coastal receiving waters namely the Shannon Plume Code: IE_SH_070_0000.

4. Assessment of the Discharge on the Receiving Waters

Ongoing monitoring data for the discharge from the WWTP serving the Kilmurry Ibrickane agglomeration is available since June 2011 and is used for this application. Flow data for both the influent and effluent to the plant is recorded daily. The flow records indicate the range of flow from the WWTP is between 36 and 674m^3/day during the period June 2011 and March 2012. The average flow discharging from the WWTP for this period is 138m^3/day. Monitoring results of the effluent is provided in Tables 1a and 1b below.

Table 1a: Effluent Monitoring for Quilty WWTP - 2011

Date	Flow M^3/day	BOD (mg/day)	COD (mg/day)	SS (mg/day)	TN (mg/day)	TP (mg/day)	NH_3-N (mg/day)
01/06/2011	88	5	12	3	8	1.23	5.6
09/06/2011	72	4	15	---	---	0.1	---
16/06/2011	76	14	57	---	---	1.27	---
23/06/2011	67	6	22	---	---	1.45	---
30/06/2011	87	3	16	---	---	1.33	---
08/07/2011	196	3	13	7	16	0.8	0.89
11/07/2011	76	4	24	---	---	0.86	---
19/07/2011	79	9	38	---	---	0.56	---
29/07/2011	80	3	41	---	---	0.81	---
02/08/2011	67	5	33	---	---	0.11	---
09/08/2011	134	3	16	19	3.9	0.01	---
16/08/2011	136	1	8	7	4	0.08	1.32
25/08/2011	108	9	27	---	---	0.08	---
31/08/2011	74	4	20	14.8	2	0.27	0.09
02/09/2011	110	4	21	18.4	6	1.08	0.14
09/09/2011	146	4	22	---	---	1.53	---
16/09/2011	99	3	---	18	---	1.8	---
22/09/2011	149	3	22	---	---	0.9	---
28/09/2011	92	3	18	---	---	2.8	---
06/10/2011	95	3	35	10	28	3.6	---
12/10/2011	108	3	23	---	---	1.5	---
19/10/2011	142	4	22	---	---	1.66	---
26/10/2011	148	6	25	---	---	2.01	---
01/11/2011	221	2	14	---	---	0.84	---
09/11/2011	101	3	44	11	36	0.06	---
16/11/2011	87	2	32	---	---	1.8	---
24/11/2011	134	3	19	---	---	0.39	---
01/12/2011	404	2	24	4	30	0.9	---
06/12/2011	262	1	2	---	---	0.39	---
14/12/2011	220	3	11	---	---	0.52	---
21/12/2011	210	1	8	---	---	0.06	---
28/12/2011	276	3	12	---	---	0.08	---
Average		**10**	**34**	**14**	**17**	**1**	**5**

Table 1b: Effluent Monitoring for Quilty WWTP - 2012

Date	Flow M^3/day	BOD (mg/day)	COD (mg/day)	SS (mg/day)	TN (mg/day)	TP (mg/day)
03/01/2012	276	2	19	/	/	0.30
12/01/2012	173	2	18	2	27	0.44
19/01/2012	134	2	16	/	/	0.09
25/01/2012	150	3	28	/	/	0.70
01/02/2012	144	2	12	4	1	1.14
08/02/2012	104	2	23	/	/	0.14
15/02/2012	108	3	22	/	/	1.74
22/02/2012	94	1	15	/	/	0.36
29/02/2012	98	4	31	/	/	1.50
07/03/2012	158	3	20	13	23	1.38
14/03/2012	77	4	27	/	/	0.76
21/03/2012	106	3	26	/	/	1.50
28/03/2012	100	3	21	/	/	0.73
Average	**132**	**2.6**	**21**	**6.3**	**25**	**0.83**

5. Assimilative capacity of the Receiving Waters

The outfall from the WWTP serving the Kilmurry Ibrickane agglomeration is to coastal waters and hence a foreshore licence was required at the planning stages of the development. As part of the foreshore licence application, an environmental assessment was carried out of the potential impacts of the pipeline on the environment, which included information on the projected nutrient discharge. A copy of the environmental assessment is provided in Attachment F.1.2. The results of nutrient dilution calculation indicate that the nitrogen compounds would be rapidly diluted below threshold levels for impacts within a short distance of the point of discharge and therefore unlikely to have a significant effect on the receiving waters.

6. Statutory designations of the Receiving Waters

(i) The receiving waters are designated as both a Special Area of Conservation (SAC) Site: *Carrowmore Point to Spanish Point and Islands*, Code: 001021 and a Special Protection Area (SPA) Site: *Mid Clare Coast*, Code: 004182. A description of both sites and their objectives is provided in Attachment F.1.3. An appropriate assessment screening process was undertaken to determine the potential impacts, if any, of the wastewater discharge from the Kilmurry Ibrickane agglomeration on the designated sites and is provided in Attachment F.1. Appropriate Assessment.

(ii) In accordance with Regulation 4 of the Quality of Bathing Water Regulations, 2008, three beaches, that are located in proximity to the discharge point from the WWTP, have been designated as Bathing Areas. Details of the three beaches are provided in Table 2 below. Bathing water profiles for all three designated beaches have been established and in accordance with Regulation 11 of the above Regulations, the water quality for all three bathing areas has been assessed as Good status.

Table2 List of Designated Bathing Waters in vicinity of discharge

No.	*Name*	*Distance from Discharge*
1	Whitestrand Doonbeg	8.8 km to the south-west
2	Spanish Point	4.0 km to the north-east
3	Whitestrand Miltown Malbay	6.9 km to the north north-east
4[1]	Seafield, Quilty	1.4 km to the south-west

(iii) Both beaches at White Strand Doonbeg and at White Strand Miltown Malbay retain Blue Flag status for which high water quality is required. The beach at Seafield, Quilty, located approximately 1.4 kilometers to the southwest of the discharge point is not a designated bathing water but is monitored during the bathing season. Monitoring data for all four bathing areas for the period 2011 is provided in Attachment F.1.4 and a copy of the Bathing Water Profiles for the three designated beaches is provided in Attachment F.1.5.

Monitoring results for 2011 indicate that both beaches at Whitestrand, Doonbeg and Seafield, Quilty attained 100% compliance with the requirements of the Regulations. One exceedance was noted for the parameter faecal coliforms at Whitestrand, Miltown Malbay and Spanish Point and for the parameter coliform bacteria there was one exceedance of the requirements at Spanish Point beach. The exceedances occurred on the same date and coincided with bad weather conditions.

(iv) The receiving waterbody is not designated as an area designated for the abstraction of water intended for human consumption.

(v) The receiving waterbody is not designated as an area designated for the protection of economically significant aquatic species (fish, shellfish).

(vi) The receiving waterbody is not designated as an area designated as nutrient sensitive.

[1] Beach at Seafield, Quilty is not designated as a Bathing Area but is monitored by Clare County Council

Attachment F.1 Appropriate Assessment

WASTE WATER DISCHARGE LICENSING
APPROPRIATE ASSESSMENT for KILMURRY IBRICKANE WWTP

WASTE WATER DISCHARGE LICENSING
APPROPRIATE ASSESSMENT

1. Introduction

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

Stage 1 Screening:

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

Stage 2 Appropriate Assessment

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

Stage 3 Assessment of Alternatives

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

Stage 4 Assessment where no alternatives exist

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

2. Stage 1 Screening:

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

2.1 Description of the treatment plant

The wastewater treatment plant (WWTP) associated with the Kilmurry Ibrickane application, is located in the Townland of Tromracastle, Quilty, County Clare.

The WWTP design is based on a sequencing batch reactor (SBR) plant with pretreatment by screening, and storm overflow interception. The final effluent is passed through an Ultraviolet disinfection unit at the end of the treatment process. The effluent discharge is to the coastal receiving waters Shannon Plume Code: IE_SH_070_0000, located approximately 350 meters offshore to the northeast of Seafield Quay. The National Grid Reference for the Primary Discharge Point (SW1) at the end of the outfall pipe is E100595; N174540.

Up until late 2010, foul wastewaters within the agglomeration area were treated by onsite wastewater treatment systems with no sewer network within the Kilmurry Ibrickane area. The WWTP and sewer network was constructed in 2010 with commissioning of the plant in September 2011.

2.2 Description of the Natura 2000 site [1]

The discharge is made to the Carrowmore Point to Spanish Point and Islands SAC Site Code 001021, which extends along the Clare coastline from Spanish Point (3km west of Miltown Malbay), in a south south-westerly direction to Carrowmore Point and is approximately 4238 HA in size. The site comprises a strip of coastline, several offshore islands and rocks (notably Mutton Island), Lough Donnell (lagoon) near Carrowmore and the open marine water of Mal Bay between the islands and the mainland. The site contains a diversity of habitats, plant and animal communities and species and is notable for the occurrence of several habitats listed on Annex I of the EU Habitats Directive namely Coastal lagoons, Reefs, Perennial vegetation of stony banks and Petrifying springs with tufa formation (Cratoneurion). Additionally the site has been highly rated for the diversity of marine plant and animal species that it supports.

The discharge is also made to the Mid-Clare Coast SPA Code: 004182. The site extends along the Clare coastline in a south south-westerly direction from Spanish Point (3km west of Miltown Malbay) to just west of Doonbeg Bay, a dstance of 14

[1]Site synopsis from www.npws.ie

km and approximately 4641HA in size. The site comprises the mainland shoreline, Mutton Island and Mattle Island, a series of rocky reefs and open marine water between the islands and the mainland. The site is of ornithological importance for a range of both breeding and wintering birds. Of special interest are the following bird species: Cormorant, Ringed Plover, Sanderling, Purple Sandpiper, Dunlin, Turnstone and Barnacle Goose.

Additionally the wetlands areas and waterbirds are a feature of interest of the site. Grey Seal occur regularly in the area and haul out at the islands. Mutton Island has a high density of hares, and also has rabbits and feral goats. A copy of the site descriptions is provided as an attachment to this report **Attachment F.1.3.**

2.3 Identification of potential impacts

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

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

- Organic pollution of the receiving waters with untreated or poorly treated sewage.
- Microbial pollution of the receiving waters to the extent that natural marine habitats or populations would suffer direct or indirect effects
- Pollution of the receiving waters by other pollutants associated with wastewater (organic compounds or heavy metals)

A deterioration of water quality could affect some habitats or species for which the site has been designated, either directly by impacting on water quality or indirectly by impacting on the food chain for various species of flora or fauna.

The discharge is made to the Carrowmore Point to Spanish Point and Islands SAC Site Code 001021 and to the Mid-Clare Coast SPA Code: 004182. The sites have been selected for the conservations of habitats listed on Annex I of the EU Habitats Directive: Coastal lagoons, Reefs, Perennial vegetation of stony banks and Petrifying springs with tufa formation and because of its ornithological importance for a range of both breeding and wintering birds.

Clare County Council undertakes monitoring of marine waters in the area during the period May-September every year, in compliance with the requirements of the EU Bathing Water Regulations. This monitoring is undertaken on a fortnightly basis, during the season, by Clare County Council at White Strand beach Doonbeg, Seafield beach, Quilty, Spanish Point beach and at White Strand beach Miltown Malbay. Both White Strand beach Doonbeg and Seafield beach are located 8.8km and 1.4km respectively to the south of the wastewater discharge location. Spanish Point and White Strand Miltown Malbay are located 4.0km and 6.9km respectively to the north of the wastewater discharge location. Monitoring data as provided in Attachment F.1.4 indicates 100% compliance with the requirements of the Regulations for Whitestrand Doonbeg and Seafield Quilty. During the monitoring period 2011, one exceedance was noted for the parameter faecal coliforms at Whitestrand, Miltown Malbay and at Spanish Point. There was one exceedance for the parameter coliform bacteria at Spanish Point beach. The exceedances occurred on the same date and coincided with bad weather conditions. Taking account of the sensitivity of the coliform indicator test for impact on water quality, the bathing water quality results for Seafield Quilty, which is located in closest proximity to the wastewater discharge location, are interpreted as evidence that the discharge from the Kilmurry Ibrickane agglomeration is not having any detrimental impact on water quality in the estuary, or on the flora and fauna of the designated site.

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

In so far as discharges to marine waters are concerned, it is critical that discharges are controlled and managed to ensure the impact of any discharge, or combination of discharges does not

- Give rise to any reduction in the diversity of floral and faunal species
- Cause a change in the integrity of the principal community types;
- Impact on water quality to the extent that the integrity of the principal community types are affected; and
- Give rise to changes in the extent of any habitat or any population such as to compromise or threaten the integrity of any habitat or the long term survival of species associated with any habitat.

The National Grid Reference for the Primary Discharge Point (SW1) at the end of the outfall pipe is E100595; N174540 to the Shannon Plume Code: IE_SH_070_0000 within the boundary of the Carrowmore Point to Spanish Point and Islands SAC Site Code 001021 and to the Mid-Clare Coast SPA Code: 004182.

This discharge from the WWTP serving the Kilmurry Ibrickane agglomeration constitutes the element of the project, which has potential for a significant effect on the adjacent designated sites. The WWTP was commissioned in September 2011 and since that date, the discharge complies with the requirements of the Urban Waste Water Treatment Regulations 2001 - 2010. Other discharges, which can be identified as having potential to have a significant effect on the site, include

- Discharges to waters in the immediate catchment of Quilty and Seafield will include:
  1. Discharges from housing not associated with the sewer network, but within the catchment area.
  2. Storm water discharges from the roads network in the immediate catchment of Quilty and Seafield.
  3. Diffuse agricultural discharges to waters within the catchment area, which drain into the Shannon Plume coastal water area.

  These discharges, which are diffuse in nature, are not considered to present a significant deterioration in water quality in the area or such as would compromise the conservation status of the designated site, or any protected species within the site.

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

- West Clare Local Development Plan 2012 – 2018 (for which an appropriate assessment, as required under Article 6 of the Habitats Directive is being undertaken).
- Clare County Development Plan 2011 – 2017 (for which an appropriate assessment, as required under Article 6 of the Habitats Directive is being undertaken).

In so far as the impact of the combined discharges (listed above), which exist to date is concerned, they can be assessed by the bathing water quality data recorded, as provided in **Attachment F.1.4,** there is no evidence of any compromised water quality in the receiving waters area immediately adjacent to the discharge from the WWTP serving the Kilmurry Ibrickane agglomeration.

2.4 Assessment of Significance of the discharge

The Carrowmore Point to Spanish Point and Islands SAC and to the Mid-Clare Coast SPA sites are designated as conservation areas on the basis of a diverse range of

marine and coastal habitats, including Annex I habitats of the EU Habitats Directive. As there is no evidence of a significant difference in water quality in the vicinity of the discharge from the WWTP serving the Kilmurry Ibrickane agglomeration., it is considered that there is no impact associated with the wastewater discharge from Kilmurry Ibrickane agglomeration on the designated habitats of the protected site.

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

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

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

2.5 Conclusion

A screening process was undertaken to determine the potential impact, if any, of the Kilmurry Ibrickane WWTP discharge on the Carrowmore Point to Spanish Point and Islands SAC and to the Mid-Clare Coast SPA. No impact is considered likely taking account of the quality of the receiving waters in the vicinity of the discharge.

3. Stage 2 Appropriate Assessment

3.1 Introduction

The potential impacts resulting from the effluent discharge from the Kilmurry Ibrickane WWTP are discussed in relation to the conservation objectives of the Carrowmore Point to Spanish Point and Islands SAC (Site Code: 001021) and to the Mid-Clare Coast SPA (Site Code:004182). Conservation management plans have not yet been published for either of these sites. The general advice from the National Parks and Wildlife Service for those sites which conservation management plans are not prepared is to ensure the features of interest of the site are identified and clear objectives for protection of the status of these features are set out. Any impacts (both positive and negative) on the site needs to be identified, and appropriate management planning needs to be in place to ensure the protection objectives for these sites are met. Examples of significant effects include loss of habitat area, fragmentation of habitat, disturbance to species using the site and changes in water resources or quality.

3.2 General Description

The discharge is made to the Carrowmore Point to Spanish Point and Islands SAC Site Code 001021, which extends along the Clare coastline from Spanish Point (3km west of Miltown Malbay), in a south south-westerly direction to Carrowmore Point and is approximately 4238 HA in size. The site comprises a strip of coastline, several offshore islands and rocks (notably Mutton Island), Lough Donnell (lagoon) near Carrowmore and the open marine water of Mal Bay between the islands and the mainland. The site contains a diversity of habitats, plant and animal communities and species and is notable for the occurrence of several habitats listed on Annex I of the EU Habitats Directive namely Coastal lagoons, Reefs, Perennial vegetation of stony banks and Petrifying springs with tufa formation (Cratoneurion). Additionally the site has been highly rated for the diversity of marine plant and animal species that it supports.

The discharge is also made to the Mid-Clare Coast SPA Code: 004182. The site extends along the Clare coastline in a south south-westerly direction from Spanish Point (3km west of Miltown Malbay) to just west of Doonbeg Bay, a dstance of 14 km and approximately 4641HA in size. The site comprises the mainland shoreline, Mutton Island and Mattle Island, a series of rocky reefs and open marine water between the islands and the mainland. The site is of ornithological importance for a range of both breeding and wintering birds. Of special interest are the following bird species: Cormorant, Ringed Plover, Sanderling, Purple Sandpiper, Dunlin, Turnstone and Barnacle Goose.

Additionally the wetlands areas and waterbirds are a feature of interest of the site. Grey Seal occur regularly in the area and haul out at the islands. Mutton Island has a high density of hares, and also has rabbits and feral goats. A copy of the site descriptions is provided as an attachment to this report **Attachment F.1.3.**

3.3 Water Quality

There is no monitoring of the receiving waters, Shannon Plume Code: IE_SH_070_0000, undertaken at present. The Water Framework Directive (WFD) 2000/60/EC, includes the objective of attaining good status in water bodies that are of lesser status at present and retaining good status or better where such status exists at present. A quality status has not been assigned to this waterbody.

The site contains a wide diversity of habitats, plant and animal communities and species. It is important that the habitat water quality is maintained to ensure the impact of any discharge, or combination of discharges does not

- Give rise to any reduction in the diversity of floral and faunal species.
- Cause a change in the integrity of the principal community types.
- Impact on water quality to the extent that the integrity of the principal community types is affected; and
- Give rise to changes in the extent of any habitat or any population such as to threaten the long-term survival of species associated with any habitat.

The main consideration regarding the impact of the discharge from the Kilmurry Ibrickane WWTP in relation to protection of the conservation status of these sites is to ensure the ongoing diversity of aquatic species and plant communities, by ensuring the quality of the waters in the vicinity of the discharge from the treatment plant. In this regard, the monitoring data on receiving water quality provided in **Attachment F.1.(i)(a) and (b)** to this report indicates that the receiving waters are of high status, with no detectable deterioration in water quality in this area. It is noted that the Marine Strategy Framework Directive 2008, with the objective to achieve good status for coastal waters by 2020, and setting up of clear targets and management programs for coastal waters are to be in place by 2012. Standards are applied in the European Communities Environmental Objectives (Surface Water) Regulations, 2009 for coastal waters for the parameters dissolved oxygen and dissolved inorganic nitrogen. Samples were taken of the marine waters in the vicinity of the discharge from the Kilmurry Ibrickane WWTP in May 2012 -See Attachment **F.1.(i)(a) and (b)** of the application. The sample indicates a value of <0.119mg/litre (as N)for the parameter Dissolved Inorganic Nitrogen. These values support the classification of the waters as "high status", applying the limit values from the European Communities

Environmental Objectives (Surface Water) Regulations, 2009 for coastal waters for dissolved inorganic nitrogen.

3.4 Organic Pollution

When untreated or poorly treated sewage effluent is introduced to a water body, living conditions for flora and fauna can be affected. Increased turbidity in the water affects light penetration, which reduces the capacity of the water to support photosynthesizing plants. Reduced oxygen levels can also have a significant damaging effect for all aquatic species. Monitoring data (albeit limited data) for the area in the vicinity of the discharge does not indicate a reduction in the water quality status in the receiving waters. The discharge itself does not contain any industrial component or any chemical liable to give rise to disturbance in the population of any habitat. Data on the discharge and on the receiving waters is provided in Attachment **F.1.(i)(a) and (b)**to this application. It is therefore considered that organic pollution is not giving rise to damage to the aquatic habitats.

3.5 Eutrophication

Eutrophication in the marine environment involves the enrichment of waters beyond natural levels with the nutrient nitrogen. This phenomenon typically results in loss of biodiversity and degradation of aquatic habitats. A full suite of ambient water quality standards and monitoring data for the marine environment are to be provided before 2012 to meet the requirements of the Marine Strategy Framework Directive 2008. However, the values presenting in the samples taken in May 2012 for the waters in the vicinity of the discharge from the Kilmurry Ibrickane WWTP are well within the limit value provided for “high status” as defined in Table 9 of the European Communities Environmental Objectives (Surface Water) Regulations, 2009 for coastal waters for dissolved inorganic nitrogen.

3.6 Other potential pollutants

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

3.7 Estimated impact of wastewater discharges from the Kilmurry Ibrickane WWTP on the receiving water quality

The impact of the discharge from the Kilmurry Ibrickane agglomeration on the nutrient status of the receiving waters is the main element of consideration in this report. This nutrient input is the most significant element for consideration in the protection of the conservation status of the various habitats and species listed for protection in the SAC and SPA. Water quality status is used as the underlying common denominator to define the potential impact of this discharge on the waters in the area. The concentration of dissolved inorganic nitrogen (DIN) in the sample taken recently indicates levels of DIN which are consistent with "high status" for these waters. On this basis, it is considered that the impact of the discharge, in combination with the other existing discharges in the area is not giving rise to any reduction in the water quality status, and does not compromise the achievement of the conservation objectives of the protected area.

3.8 Analysis of in combination effects

The discharges from the Kilmurry Ibrickane WWTP, and the diffuse discharges arising from the catchment of the designated site are taken into account in the assessment of water quality at two designated SAC and SPA sites. The study of water quality data, as provided in **Attachment F.1.(i)(a) and (b)** of the application, indicates that the operation of the Kilmurry Ibrickane WWTP is not having any adverse impact on water quality in the designated site, or any adverse impact on the conservation status of the site.

A summary of the potential impacts on the designated site is set out hereunder in Table 1. This Table is prepared on the basis of consideration of various elements liable to give rise to changes in the habitat area, fragmentation of the habitat area, or, damage to species in the protected area. In so far as the protection of these areas is concerned the objective is to ensure the conservation of the habitat type and to maintain its structure for the future, given on the one hand the possible unfavourable influences and on the other hand all the reasonable conservation effort which is possible. An essential feature for their conservation, in the context of this licence application is the prevention of deterioration of water quality.

Table 1: Assessment of impact of discharges from the Kilmurry Ibrickane agglomeration on SAC and SPA sites.

Describe any likely changes to the site arising as a result of : **• reduction of habitat area:** **• disturbance to key species;** **• habitat or species fragmentation;** **• reduction in species density;** **• changes in key indicators of conservation value (water quality etc)**	
Reduction of habitat area	The WWTP is newly constructed with appropriate design capacity and treatment process, which includes disinfection of the effluent discharge , and will provide for ongoing protection of habitats in the area. No reduction in habitat area is anticipated and water quality data does not indicate any significant impact on receiving waters quality in the area.
Disturbance to key species; plants	None
Habitat or species fragmentation	No priority habitat is identified in the vicinity of the discharge.
Reduction in species density	No reduction in species density is anticipated.
Changes in key indicators of conservation value	The discharge from the Kilmurry Ibrickane agglomeration will not alter the existing conservation status of this site. The newly constructed WWTP, coupled with monitoring and management of the unit (under licence) will reduce the potential for pollution events by treatment of the pollution load prior to discharge, prevention of overload of the treatment facility on an ongoing basis, and, management of storm overflows to ensure no untreated wastewater discharges take place. This will have a positive impact on the conservation status of the site
Effects of climate change	Increases in storms and precipitation as a result of climate change are recognised as potential sources of untreated discharges to watercourses. The treatment works have included containment of storm water overflows to enable flow balancing and treatment of the higher storm flows, therefore reducing the risk of discharge of nutrients to the receiving waters.
Describe any likely impacts on the Natura 2000 site as a whole in terms of any interference with the key relationships that define the structure of the site;	
Interference with the key relationships that define the structure of the site;	The newly constructed WWTP facility and collection (and treatment) of storm water overflows will provide ongoing protection of the water quality status of the receiving waters and associated habitats. Loss of species will not occur as a result of the discharge from the WWTP facility
Fragmentation	Fragmentation is not considered to be an indicator as a result of the discharge from the WWTP. It is not considered likely that the discharge from the new WWTP will give rise to any fragmentation of the site
Disruption and disturbance	Disruption is not associated with the discharge from the agglomeration. No change to the drainage regime is proposed. No bypassing of the treatment works is proposed at any time

Describe any likely impacts on the Natura 2000 site as a whole in terms of any interference with the key relationships that define the structure of the site;	
Change to key elements of the site (e.g. water quality etc.)	Water quality is not currently showing evidence of impact from the existing discharge. The loading to the treatment plant in terms of population served and influent monitoring will be monitored. On-going monitoring of water quality will ensure that the discharges from the WWTP will maintain exacting water quality standards. No potentially polluting substances will be permitted to discharge to off-site surface water or storm drains. If analysis or observations of contamination occur, an immediate investigation will be carried out to isolate the source, measures will be put in place to reduce or eliminate the contamination to the environment and it will be reported to the Licensing Authority.
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts are not known.	The operation of the new WWTP, including the treatment of storm overflow, nutrient reduction by secondary treatment and disinfection of the effluent discharge will have a positive impact in the receiving waters. No disruption or disturbance to the protected site is included as an element in the consideration of the discharge

3.9 Mitigation Measures

The principal mitigation measure set out in the application is the fact that the WWTP, which treat wastewaters from the Kilmurry Ibrickane agglomeration, is recently constructed. The design capacity of the WWTP is such that it will ensure compliance with the Urban Waste Water Regulations. The treatment process includes disinfection of the wastewaters before final discharge. The full description of the treatment works is provided in the licence application.

4. Stage 3 Alternatives

The appropriate assessment presented has not identified adverse impacts associated with the project, or the project in combination with other projects on the receiving waters. Appropriate mitigation measures are in place to ensure that any potential adverse impacts are avoided through provision of appropriate infrastructure, management of the infrastructure and monitoring of the receiving waters. As no residual adverse effects are identified on the Special Protection Area or on the Special Area of Conservation, consideration of alternatives is not required in this process.

5. Stage 4 Imperative Reasons of Overriding Public Interest

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

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Nicholas O'Dwyer Ltd

Proposed sewage outfall at Quilty, Co. Clare

Environmental Assessment - Addendum

January 2005

Entec UK Limited

Certificate No. EMS 69090 Certificate No. FS 13881

Disclaimer

This report has been prepared in a working draft form and has not been finalised or formally reviewed. As such it should be taken as an indication only of the material and conclusions that will form the final report. Any calculations or findings presented here may be changed or altered and should not be taken to reflect Entec's opinions or conclusions.

Executive Summary

Clare County Council are applying for a foreshore licence for an outfall to discharge effluent near to the town of Quilty, Co.Clare. The proposed outfall lies within Carrowmore to Spanish Point and Islands candidate Special Area of Conservation (cSAC). Dúchas, the Heritage Service of the Department of Environment, Heritage and Local Government, require an application for a foreshore licence to include a description of the environment along the pipeline route, and an assessment of the potential impacts of the pipeline on this environment. Entec were commissioned in 2003 to carry out a biological survey of the area of the proposed development and an assessment of potential impacts on marine ecology.

Following submission of the Environmental Assessment for review, Dúchas requested the provision of additional information on the potential impacts of the development. Entec were subsequently appointed to undertake additional assessment work and provide information on: the projected nutrient discharge; the likely impacts on resident biological communities in particular from increased nutrients; and an assessment of the likely impacts of blasting activities on marine mammals.

The results of nutrient dilution calculations indicated that nitrogen compounds would be rapidly diluted to below threshold levels for impacts within a short distance of the point of discharge. The pipeline is, therefore, unlikely to have a significant effect on either the receiving water or resident biological communities. Excavation of the pipeline trench will cause habitat removal and abrasion both in the littoral and sublittoral, although, these impacts are expected to be of minor significance due to the small affected area and the lack of highly sensitive communities. Effects on littoral and sublittoral communities may be further mitigated by adapting construction methods to both minimise physical disturbance and avoid the most sensitive habitats.

By reviewing of available information on the distribution, ecology and effects of explosives on marine mammals it has been possible to suggest safe distances for marine mammals and corresponding maximum source sound levels for explosives. By monitoring and enforcing safe distances for marine mammals, impacts on marine mammals are predicted to be of minor significance. A range of additional mitigation measures have also been highlighted, which could be implemented (subject to logistical and engineering constraints) to further mitigate impacts of blasting on marine mammals.

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1. Introduction

Clare County Council are applying for a foreshore licence to build an outfall to discharge effluent near to the town of Quilty, Co.Clare. The proposed outfall lies within Carrowmore to Spanish Point and Islands candidate Special Area of Conservation (cSAC) (cSAC 1021). Following review of the Environmental Assessment detailing the potential impacts of the pipeline on this environment, Dúchas, the Heritage Service of the Department of Environment, Heritage and Local Government, have requested the following additional information:

> A projection of nutrient discharge volumes (based on concentrations and projected flow rates) arising from this proposed development with an assessment from a professional ecologist of the likely extent of impact on the marine habitats and species at the site. Obviously, this may give due consideration to the exposure regime, likely dispersion/dilution rates, nutrient inputs relative to existing levels, and the resident biological communities.
>
> A survey from a suitably qualified marine mammal expert providing an assessment of the likely impacts of blasting (associated with the development) on marine mammals in the site with recommendations for mitigation/operating procedures where appropriate.

Entec UK have been appointed by Nicholas O'Dwyer Ltd. to carry out the aforementioned additional assessments, with respect to the proposed Quilty outfall development. This addendum report is meant to supplement the previous Environmental Assessment report and as such only addresses the issues specified above.

2. The proposed pipeline

Details of the pipeline design and construction methods have yet to be finalised so the assessment has been based on the most probable construction scenario as outlined to Entec UK by Nicholas O'Dwyer Ltd.

The pipeline is to be laid 1.5m below the ground surface. It is expected that blasting will be required for the lower 1m. Installation will be via jack up rig and excavator. Pipe diameter will be approximately 200mm.

The pipe will be moved into position during construction by floating it along the sea surface and sinking it into the trench using rock weights. The pipeline may need some adjustment in its position once sunk, to ensure it is in the trench. The trench will be backfilled and covered with stone/concrete protection. The diffuser arrangement will be rock armoured to protect it from potential damage by boat anchors.

The length of the pipeline from Mean High Water Spring (MHWS) tide to the point where the effluent is discharged to the ocean is expected to be 350m. The outfall will protrude around 50cm above the seabed, equating to a submergence of 4.5m at Mean Low Water Spring (MLWS) tide,. The maximum depth of submergence along the proposed route is 4.8m at MLWS tide.

It is expected that the pipeline will be fitted with a diffuser with two riser ports, as a minimum, with the effluent undergoing secondary treatment before being discharged. Dry Weather Flow (DWF) rates from the outfall are expected to be in the region of 277m^3/day (3kg phosphorus (P) and 12kg nitrogen (N)), with flow rates increasing 3-fold in times of wet weather, to approximately 840m^3/day (referred to as 3DWF).

3. Nitrogen dilution

3.1 Introduction

The issues surrounding the potential effects of nutrients, in relation to nature conservation in estuaries and coastal waters have been reviewed by Parr and Wheeler (1996) and Scott *et al* (1999). Within a fully marine environment (i.e. with no, or limited, freshwater influence) it is generally accepted that nitrogen is the bio-limiting nutrient (MacGarvin, 1995). As such, this assessment has focussed on both the loading and ambient concentrations of nitrogen discharged by the proposed Quilty Waste Water Treatment Plant (WWTP).

Nitrogen cycling in estuaries and coastal waters is a complex phenomenon. Nitrogen is a major constituent of biota, so living plants and animals (including plankton) are a sink for nitrogen. However, the largest sink for nitrogen remains the sediment, particularly in terms of organic nitrogen (much of which is from dead biota) but, once in the sediment, this organic nitrogen can be broken down (mineralised) to produce bioavailable nitrogen, which is released back into the water column (Cole *et al.,* 1999).

Nitrogen (N) losses are achieved via denitrification (the conversion of nitrate to molecular nitrogen via ammonium). The longer the residence time, the warmer the temperature and shallower the estuary, the greater the N losses will be via denitrification.

Cole *et al.,* (1999) identify a range of effects of nitrogen compounds and this is reproduced in Appendix A.

3.2 Nitrogen loadings

The Quilty WWTP will be capable of providing wastewater treatment to a population equivalent of 1,230. An appropriate level of treatment is required for a plant of this size under the Urban Wastewater Treatment Regulations. In this case, secondary treatment with UV irradiation in accordance with the planning permission will be provided. Calculations show that the 277m^3 of treated effluent will be discharged each day containing approximately 12kg of nitrogen. This nitrogen loading and the DWF have been used in the dilution calculations in this report. During storms, although loadings may increase during the initial flush, sewage rapidly becomes more diluted and the loading tends to fall back to normal. With 3DWF and the same loadings, calculations show that nitrogen concentrations after initial dilution will be lower than at DWF. Thus adoption of DWF as the basis for calculations is justified as the 'worst-case'.

3.3 Dilutions and resultant nitrogen concentrations

When pollutants are introduced into the marine environment, they are subject to a number of physical processes which result in their dilution and dispersion in the receiving water. Dilution is one of the main processes for reducing the concentration of substances away from the

discharge point. Dilution is more important for reducing the concentration of conservative substances (those that do not undergo rapid degradation, e.g. metals) than for non-conservative substances (those that do undergo rapid degradation, e.g. some organic substances). In the near and medium fields nitrogen can be considered to be a conservative parameter.

Dilution capacity of the receiving water can be defined as the effective volume of receiving water available for the dilution of the effluent. The effective volume can vary according to tidal cycles and transient physical phenomena such as stratification. The process of dilution can be separated into initial dilution and secondary mixing:

- initial dilution: buoyant rising and turbulent mixing of the effluent from the discharge point to the surface of the sea (due to density differentials) to form a surface 'boil'; and
- secondary mixing: the surface plume then forms and spreads and secondary mixing takes place. Eventually, the plume disperses both vertically and horizontally in the water column as the density differential becomes inconsequential and the concentration of pollutants in the water column approaches uniformity. Further dilution occurs as a result of the action of tide, wind and wave driven currents.

The initial dilutions experienced by the buoyant discharge have been calculated for both spring and neap tides to identify nitrogen concentrations following this initial dilution.

3.3.1 Initial dilutions

The calculations are based on the WRc initial dilution calculation (for moving water) and the Cederwall calculation (for still water) as presented in the WRc, *Design Guide for Marine Treatment Schemes*, 1990. Appendix B contains further explanation of these two calculations.

A worst case situation is modelled, using nitrogen concentrations estimated at low ambient receiving water current velocities. There will be a minimum of two diffuser ports and two have been assumed in these calculations as representing the worst case. Wave action has not been included in the calculations. The results obtained can thus be seen as a very conservative (i.e. worst-case) estimation of initial dilution.

Input information was derived as per Table 1.1.

Table 1.1 – Initial dilution calculation input data

Data	Source	Value	Rationale
WRc Calculation			
Effluent Density	N/A	1	Assumed that effluent is equivalent to fresh water in density
Ambient Receiving Water Density	N/A	1.035	The receiving water is marine and full seawater density has been used.
Total Volumetric Flow Rate	Nicholas O'Dwyer Ltd	3.21 l/s ($0.0032m^3/s$)	DWF has been used to simulate worst case conditions.
Volumetric Flow Rate Through Each Port	Nicholas O'Dwyer Ltd	1.6 l/s ($0.0016m^3/s$)	DWF has been used to simulate worst case conditions.
Depth from discharge to surface	Diffuser depth supplied on Drawing 20281/LF/03 (Nicholas O'Dwyer). Tidal heights interpolated from Drawing 20281/LF/03 and chart datum given on Admiralty Chart 3338 (Kilkee to Inisheer) A simple sine wave has been assumed for the tidal curve and the diffusers have been assumed to be at 0.5m above bed level.	Variable	Depths were calculated for mean spring and mean neap tides every ½ hour using the available data.
Ambient Receiving Water Velocity	Values of 0.2m/s for neap tides and 0.3m/s spring tides as a peak velocity have been assumed. Intermediate velocities have been interpolated from a sine curve.	Variable	No data have been available for this assessment although Nicholas O'Dwyer indicate low current velocities of the order 0.2m/s to 0.3 m/s. The peak velocities assumed are considered to represent very low ambient velocities.
Constants C_1 and C_2	N/A	0.27 and 0.27	These constants represent median minimum dilution values i.e. to predict dilution rate likely to be exceeded 50% of the time.
Cederwall Calculation (still water)			
Effluent Density	As per WRc Input Data		
Ambient Receiving Water Density	As per WRc Input Data		
Depth from discharge to surface	As per WRc Input Data		
Jet Velocity	Pipe details and peak flow rate supplied by Nicholas O'Dwyer	0.0128 m/s	Calculated assuming half of DWF passes through each diffuser.
Jet Diameter (diffuser port)	Pipe details supplied by Nicholas O'Dwyer	0.15m	Two diffuser ports assumed.

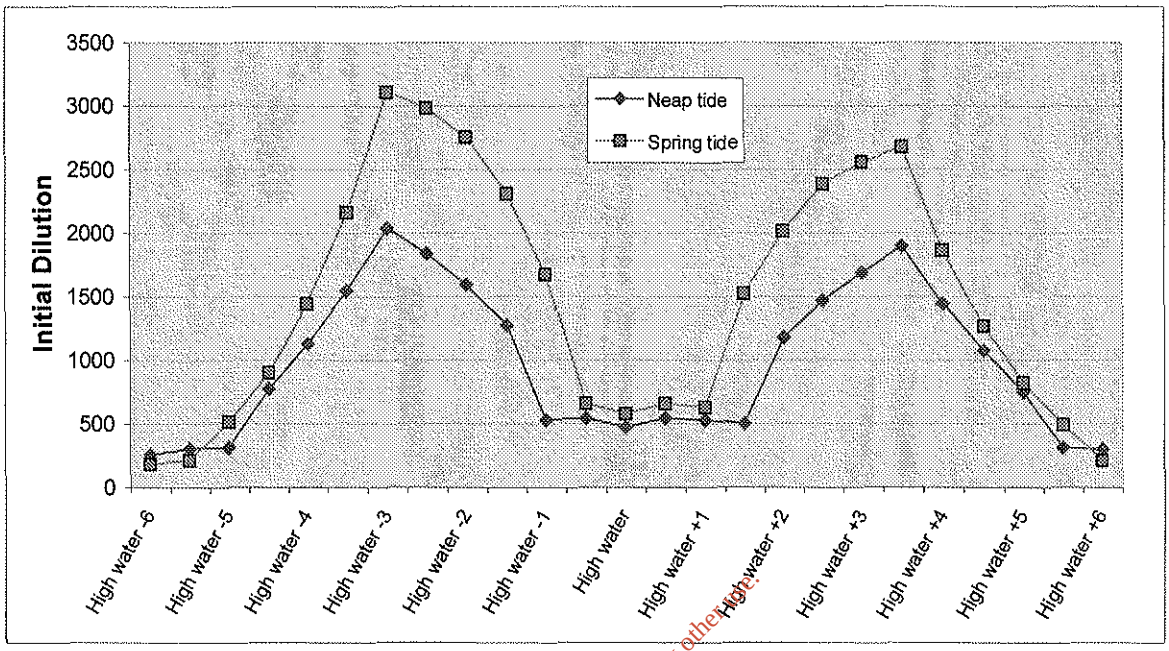
Although current magnitudes are weak in the area of the discharge the WRc (moving water) equation has been used to calculate initial dilutions but near high and low water it is assumed that current velocities drop to close to zero and the Cederwall (still water) equation is substituted. Table 1.2 and Figure 1.1 presents the results of the initial dilution modelling exercise.

Table 1.2 Calculated initial dilutions through full tidal cycle

Tidal State	Spring Tide Initial Dilution factor	Neap Tide Initial Dilution factor	Applied Calculation
HW-6h	184	259	Cederwall
HW-5.5h	213	301	WRc
HW-5h	511	314	WRc
HW-4.5h	902	775	WRc
HW-4h	1444	1128	WRc
HW-3.5h	2166	1546	WRc
HW-3h	3112	2041	WRc
HW-2.5h	2984	1837	WRc
HW-2h	2754	1594	WRc
HW-1.5h	2310	1276	WRc
HW-1h	1677	528	WRc
HW-0.5h	659	542	WRc
High Water	580	473	Cederwall
HW+0.5h	659	542	WRc
HW+1h	631	528	WRc
HW+1.5h	1523	504	WRc
HW+2h	2019	1180	WRc
HW+2.5h	2388	1470	WRc
HW+3h	2559	1689	WRc
HW+3.5h	2675	1898	WRc
HW+4h	1863	1444	WRc
HW+4.5h	1267	1076	WRc
HW+5h	826	749	WRc
HW+5.5h	492	312	WRc
HW+6h	213	301	Cederwall

HW = High Water

Figure 1.1 Predicted Quilty Outfall initial dilutions for neap and spring tides



It can be seen from Figure 1.1 that the initial dilutions associated with the discharge are large (mainly >500) which is mainly a function of the depth of the outfall. The median minimum initial dilutions are shown and this represents dilution likely to be exceeded 50% of the time.

It can be seen that predicted initial dilutions are at a minimum around the slack water periods of High and Low Water. The dilutions represent three regimes: still water at LW and HW, density dominated (near field) dilution and current dominated (far field) dilution, which are calculated using separate equations.

3.3.2 Nitrogen concentrations after initial dilution

Using the initial dilutions presented in Table 1.2 and an assumed concentration of 43.3mg/l total nitrogen in the discharge[1] the contribution of the discharge to environmental concentrations of nitrogen after initial dilution has occurred can be calculated. These results are presented in Table 1.3.

As no locally measured baseline data were available, the background concentrations for nitrogen and phosphorus were taken from Marine Institute Fisheries Research Centre data for Atlantic oceanic concentrations of nutrients entering the Irish Sea through St George's Channel. These figures were 6.6µmole/l (0.092mg/l) of total oxidised nitrogen (as N) and 0.45µmole/l (0.014mg/l) of phosphorus (as P). Resultant nitrogen concentrations in the marine environment

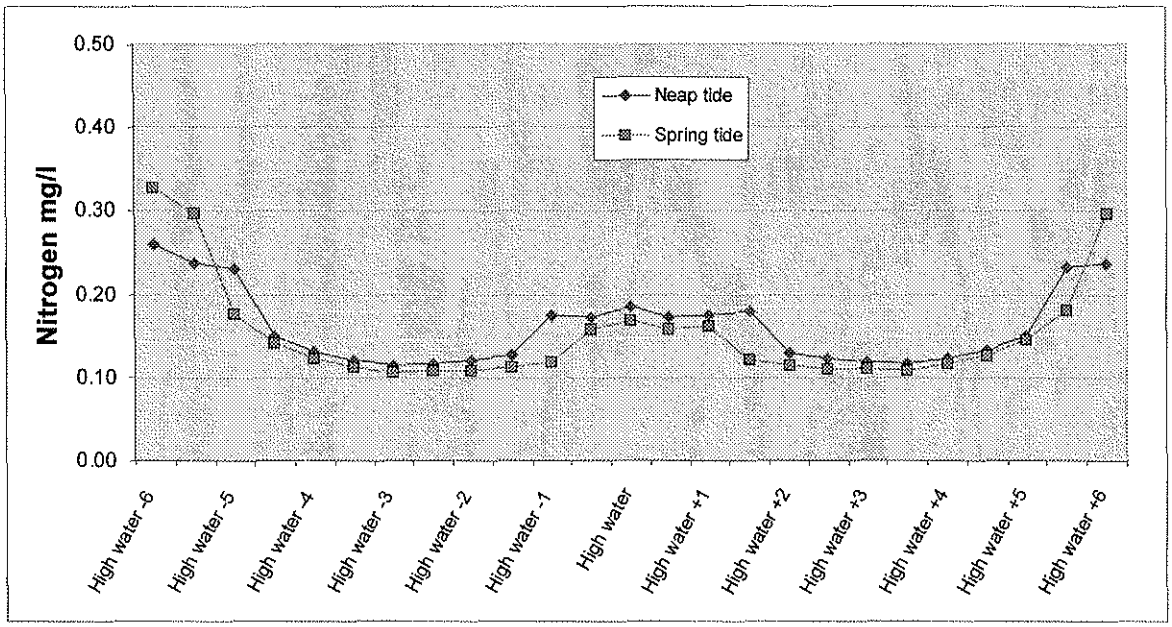
[1] There are no nitrogen or ammonia standards to be applied to the discharge so a value of 43.3mg/l nitrogen has been used. This accords with the loading calculation presented in Section 1.1.

were calculated and are shown in Table 1.3 and Figure 1.2. Similar calculations were undertaken for phosphorus to allow examination of the N/P ratio (known as the Redfield Ratio).

Table 1.3 Calculated Nitrogen concentrations after initial dilution

Tidal State	Spring Tide Nitrogen Contribution (mg/l N)	Neap Tide Nitrogen Contribution (mg/l N)	Spring tide resultant concentration (mg/l)	Neap tide resultant concentration (mg/l)
HW-6h	0.235	0.167	0.328	0.260
HW-5.5h	0.204	0.144	0.296	0.237
HW-5h	0.085	0.138	0.177	0.230
HW-4.5h	0.048	0.056	0.140	0.148
HW-4h	0.030	0.038	0.122	0.131
HW-3.5h	0.020	0.028	0.112	0.120
HW-3h	0.014	0.021	0.106	0.114
HW-2.5h	0.015	0.024	0.107	0.116
HW-2h	0.016	0.027	0.108	0.120
HW-1.5h	0.019	0.034	0.111	0.126
HW-1h	0.026	0.082	0.118	0.174
HW-0.5h	0.066	0.080	0.158	0.172
High Water	0.075	0.092	0.167	0.184
HW+0.5h	0.066	0.080	0.158	0.172
HW+1h	0.069	0.082	0.161	0.174
HW+1.5h	0.028	0.086	0.121	0.178
HW+2h	0.021	0.037	0.114	0.129
HW+2.5h	0.018	0.029	0.111	0.122
HW+3h	0.017	0.026	0.109	0.118
HW+3.5h	0.016	0.023	0.109	0.115
HW+4h	0.023	0.030	0.116	0.122
HW+4.5h	0.034	0.040	0.127	0.133
HW+5h	0.052	0.058	0.145	0.150
HW+5.5h	0.088	0.139	0.180	0.231
HW+6h	0.204	0.144	0.296	0.237

Figure 1.2 Predicted Quilty Outfall nitrogen concentrations after initial dilution



Note that the calculations above assume that flow is divided equally between the two diffusers and that the plumes do not overlap. This is expected to be largely true for diffusers located at 5 m centres, as proposed, on an outfall pipe perpendicular to the main tidal flow, based on indications in the WRc Outfall Design Manual.

Use of total oxidised nitrogen figures for the oceanic background levels (i.e. not including ammonia) is justified on the basis that ammonia is not normally present in significant concentrations in marine waters.

3.3.3 Secondary Dilutions

Tidal advection will cause the plume to move away from the surface boil and turbulent mixing will occur. The result is that lower effluent concentrations will occur away from the discharge point until the effluent can be considered to be fully mixed with the receiving coastal waters.

No information on secondary dilutions is available but the Quilty discharge is directly into exposed coastal waters which are not designated as sensitive under the Urban Wastewater Treatment Regulations, 2001 (Statutory Instrument 254). The purpose of The Urban Waste Water Treatment Directive (Directive 91/271/EEC, amended by 98/15/EC) is to prevent the environment from being adversely affected by the disposal of inadequately treated urban waste water, and discharges into 'sensitive areas' are subject to more stringent treatment.

Although the tidal currents have been identified as being weak in the area, wind and wave mixing is likely to be significant in the location which is exposed to the prevailing wind and wave climate of the Atlantic.

3.4 Compliance with water quality standards

Few formal standards are available for nutrients in the marine environment. Some guidance is provided by work undertaken in the UK by the Comprehensive Studies Task Team, set up to advise on implementation of the Urban Waste Water Treatment Directive, who established 12mmole/m^3 of dissolved available inorganic nitrogen as the criterion for defining waters as hypernutrified and thus having potential for eutrophication problems. This equates to 0.168mg/l of nitrogen as N.

Examination of Table 1.3 shows that this standard is met after initial dilution, that is by the time the plume reaches the surface, for most of the tidal cycle on spring tides and over half of the cycle on neap tides. Another two-fold dilution will achieve compliance at all tidal states. Thus it is clear that the area of water that will experience elevated nitrogen concentrations at a level that would cause any concern in terms of potential eutrophication will be small and limited to the surface boil above the discharge and a very limited area around it.

OSPAR recommends consideration of the winter N:P ratio (the Redfield ratio) as an indicator of potential for growth of nuisance and toxic species. The normal environmental value for this ratio is 16:1 (based on concentrations expressed in moles). Levels above 25:1 have been proposed as the criterion for defining an 'elevated level' (OSPAR, 2001). The baseline data used in this report show a ratio of 14.7:1, close to the norm. Ratios calculated after input of the proposed Quilty treated sewage discharge and following initial dilution vary between 10:1 and 13.5:1, indicating that the discharge is unlikely to lead to increases in growth of toxic or nuisance species, even within the surface discharge plume.

OSPAR also proposes using increases of 50% above baseline for N or P as an ecological quality objective (EcoQO). Increases in nitrogen concentrations predicted in this case are within this limit during the flood and ebb tides but the limit is exceeded in the surface plume immediately above the discharge within 1.5h of slack water. However, a further threefold dilution or less will be sufficient in all cases to achieve compliance. This will occur within a very short distance, so the conclusion is that any ecological effects in the water column will be confined to a small area immediately around the discharge and will be insignificant in terms of the local coastal environment.

4. Marine benthic ecology

4.1 Methods and sources of information

The baseline environment has been comprehensively described in the Quilty Environmental Assessment. As such only a brief description of the survey methods and baseline environment is shown here. For a more detailed description please refer to the Quilty Environmental Assessment report (Entec, 2003).

Previous sublittoral surveys had been undertaken in this area as part of the BioMar Project with two sites examined in the vicinity of Quilty (Picton & Costello, 1998). However, both of these sites were located at Mutton Island, further offshore than the current survey area and not considered to be comparable. The assessment was therefore largely based on the results of the baseline biological survey carried out by Ecological Consultancy Services Ltd (EcoServe) for Entec UK.

The baseline survey comprised littoral biotope mapping following the techniques developed during the SensMap project (Emblow *et al.,* 1998) and in the UK Marine Monitoring Handbook (Davies *et al.,* 2001), while the sublittoral environment was surveyed using a remotely operated vehicle (ROV) and grab sampler. The results of both intertidal and subtidal surveys were compared to existing data and interpreted using the biotope classification (Connor *et al.,* 1997a; Connor *et al.*, 1997b).

The results of the previous Environmental Assessment (Entec, 2003) have been examined following which an evaluation of the potential effects of the proposed pipeline on resident biological communities was undertaken, on both a qualitative and quantitative basis. Published reviews of the effects of outfalls on marine communities (Holt *et al.,* 1995; Hill *et al.,*1998; Birkett *et al.,* 1998) were used to give qualitative indication as to potential impacts. Reference was then made to the quantitative results of nutrient dilution calculations to assess the likely impacted area.

4.2 Baseline Description

The proposed outfall lies within Carrowmore to Spanish Point and Islands candidate Special Area of Conservation (cSAC) (cSAC 1021). The site has been listed for two Annex 1 habitats: "perennial vegetation of stony banks" and "reef". Perennial vegetation of stony banks are not found in the vicinity of the proposed pipeline but extensive littoral and sublittoral rocky reefs are present and these could potentially be impacted. The stretch of coastline between Quilty and Lurga Point is also important for birds, and the extensive mudflats and sandflats support high numbers of wintering waders including a nationally important flock of purple sandpiper.

A baseline biological survey was carried out by Ecological Consultancy Services Ltd (EcoServe) for Entec UK. The study area encompassed the littoral habitats along a stretch of coastline approximately 1km in length, just south of the town of Quilty, and sublittoral habitats in the vicinity of the pipeline route (Appendix C, Figures 1 and 2).

The Carrowmore to Spanish Point cSAC hosts a range of habitats which include bedrock shores influenced by warm water from the North Atlantic drift with well developed red algal communities and a diversity of marine plant and animal species. Intertidal and subtidal surveys of the pipeline route and an area 500m either side were carried out during June 2003. The results of these surveys are summarised below. For detailed information please refer to the original Quilty Environmental Assessment Report (Entec, 2003).

4.2.1 Littoral environment

The stretch of shoreline surveyed is characterised by a number of bedrock outcrops which run almost continuously parallel to the shore line within the survey area. These have been described as underlying carboniferous grits which are bedded at a low angle and give rise to surf conditions in places along the parts of the coastline (Dúchas, 1997). The area lies within the Carrowmore to Spanish Point cSAC a site which has been described as hosting a range of habitats which include bedrock shores influenced by warm water from the North Atlantic drift with well developed red algal communities and a diversity of marine plant and animal species (Dúchas, 1997).

Similar bedrock shores have been described in this area as part of the BioMar Project (Picton & Costello, 1998). Stretches of the coastline in Co. Clare with limestone bedrock shores surveyed for BioMar, include Spanish Point (approximately 3.5km north of Quilty) and McGraths point (approximately 8km south of Quilty). Similar rocky habitats and species were noted at both sites, which describe moderately exposed rocky shores with sharp high jagged limestone ridges.

Overall the biotopes found were common and widespread in Ireland. Species were typical of rocky shore habitats. None of the species recorded were of specific nature conservation importance. However the habitats were relatively diverse and good examples of their biotope type, particularly the lower shore rock pools which had abundant red algae and epifauna.

4.2.2 Sublittoral environment

The video footage clearly indicated the extent of the rocky habitats and kelp forest in the survey area. Bedrock limestone dominates the substrata, with variations in topography similar to those found on the shore. None of the biotopes or species recorded are unusual in Ireland or of specific nature conservation importance. The shallow water rocky communities around much of the Irish coast are dominated by kelp with encrusting fauna and foliose red algae (Marine Institute, 1999).

It is reasonable to assume that many of the rocky biotopes support a range of epifauna and fish species. However, it is not unusual for kelp forests with foliose algae to support fewer animals, than more sheltered cobble areas (Connor *et al.*, 1997b). Surf conditions occur in some parts of the bay, but in general the site is somewhat sheltered by offshore islands and Seapoint harbour to the south.

A broad zonation of habitats occurs along the route of the pipeline from more wave exposed kelp forest on bedrock EIR.Lhyp.Ft, to more scoured habitats in places between the bedrock (SIR.Lsac.Ldig). Sand scour in sediment in suspension can encourage ephemeral algae such as the *Enteromorpha* sp. and *Ulva lactuca* observed at sites 6.2 and 12 during the sublittoral survey (See Appendix C, Figure 2). Sandy habitats are evident in the outer survey area. The distribution of these is not clear further offshore. These habitats are shallow, have sparse fauna and the sand is mobile and subject to wave action.

4.2.3 Sediment

The granulometric analysis showed samples from all three sublittoral sites analysed (S1 - S3) (See Appendix C, Figure 2) to be similar in composition and classified as sand (Folk, 1954) or medium sand (Wentworth, 1922). These sediments were very mobile and as a result tend not to support a diverse infauna. Organic matter content at all three was low. It is difficult to make assumptions on the low organic content of the sand but the mobility of the sediment would most likely inhibit the accumulation of organic matter.

4.3 Potential impacts on marine benthic ecology

Potential impacts of the pipeline development, both for the littoral and sublittoral, include habitat removal, physical abrasion, smothering and increased nutrient input.

4.3.1 Littoral

There will be a direct loss of the intertidal rocky reef community along the route of the pipeline due to excavation of the trench and associated blasting activities, although, this impact is expected to be very localised in its extent. The surface of the trench, once filled with concrete would be recolonised. However, concrete infilling offers a fairly uniform surface for recolonisation so diversity of the recolonised community will not be as large as would be expected if rock armouring were used. There is no substantial biological risk associated with leachates and bioaccumulation from concrete or rock armouring (Hill *et al.*, 1998). Intertidal sand biotopes are not in the direct path of the pipeline so direct physical loss of these environments is not expected.

Use of the jack-up rig and excavator will result in a high degree of physical abrasion within a narrow corridor either side of the pipeline. Organisms or groups of organisms in this area are likely to be dislodged during the installation process. Loss and abrasion in the upper shore will be mostly confined to fucoids and ephemeral green algae, barnacles and limpets. The higher species diversity present at lower shore levels means that more species will be impacted. Some physical abrasion will also be caused by the movements of construction plant although this impact is expected to be less severe and more diffusely spread. Indirect impacts to the intertidal sand biotopes may arise through physical damage due to abrasion but recolonisation of these dynamic environments should be rapid.

Outside of the immediate pipeline area, intertidal communities may be subject to limited smothering from material released during trench excavation. However, this should be very localised.

During the operation of the pipeline there will be an increased input of nutrients into the receiving waters. It is therefore likely that intertidal communities will be subjected to increased levels of nutrients while immersed. Reef communities are moderately sensitive to nutrient and organic enrichment, which may lead to increases in species of ephemeral green algae such as *Enteromorpha* spp. However, secondary treatment of the effluent and the use of a diffuser to spread the distribution of effluent are likely to minimise the levels of received nutrients. Additional information on the effects of Nitrogen compounds in marine waters is shown in Appendix A.

4.3.2 Sublittoral

As for the littoral environment, construction of the pipeline will cause a direct physical loss of kelp habitat along the path of the outfall, due to excavation of the trench and associated blasting activities. The area in the immediate vicinity will be subject to intensive abrasion from use of the jack-up rig and trench excavator, while, blasting activities may potentially affect a wider area. The material released during excavation and blasting will increase turbidity locally and potentially cause short term smothering, although this should be cleared within a few tidal cycles.

The kelp forests and subtidal rocky shore communities, which make up the subtidal environment, are highly sensitive to physical loss by removal and moderately sensitive to smothering. Kelp forest communities are dependent on a certain level of water clarity for photosynthesis so increased turbidity may have a detrimental effects on their physiological functioning. The deposition of silt may also cover available hard substrata and interfere with the process of spore attachment. Young sporelings or holdfasts are also sensitive to being covered by silt, which can inhibit their growth and development (Birkett *et al.*, 1998).

Anemones and tunicates are found in the immediate area of the pipeline route. As sedentary suspension and filter feeders, these organisms are unable to move away from the site and equally cannot migrate into the areas after disturbance. Therefore recolonisation will be entirely dependent on reproduction and the settlement of juvenile forms. Kelps, fucoids and other macroalgae are also sedentary, and will also be dependent on settlement from juvenile forms. The rate of recovery will depend on the construction period length and time of construction. Larval colonists will be most abundant during the spring months, thus recolonisation will be more rapid at this time.

Subtidal infaunal communities in the sediment will be indirectly impacted by smothering during blasting and trench digging. However, this community is sparse and typical of sandy communities with resident organisms adapted to a mobile environment. Communities of this type have a degree of tolerance to disturbance, typically have short life spans, and are likely to recover in a short time once the disturbance has stopped.

Operation of the pipeline will lead to an increased input of nutrients into the receiving waters. This has the potential to affect sublittoral communities through the creation of eutrophic conditions. However, secondary treatment of the effluent and the use of a diffuser to spread the distribution of effluent will reduce the levels of nutrients in the effluent. Additional information on the effects of Nitrogen compounds in marine waters is shown in Appendix A.

Rock blasting will have a high impact on the marine communities in the immediate vicinity. Fish in the immediate locality are likely to be killed by direct blasting or the blast wave. However, disturbance due to noise from construction machinery may mean that most fish avoid the area of blasting impact.

Use of the jack up rig during the construction may have the potential to release contaminants (antifouling, fuel etc.) which may also be deposited on the sea floor and affect the local biota.

4.4 Evaluation of effects

The evaluation of effects has been based on published literature on the impacts of anthropogenic disturbance (Holt *et al.*, 1995; Birkett *et al.*, 1998; Hill *et al.*, 1998) including effluent on marine species. This has been complemented by a site-specific assessment of the sensitivities of those biotopes recorded during the biological surveys by reference to the Marine Life Information Network web site (*MarLIN*).

The *MarLIN* web site classifies the generic sensitivities of different biotopes through reference to published literature on the impacts of environmental and physical disturbance (e.g. substratum loss, abrasion and physical disturbance, smothering, and changes in nutrient levels) for species the characterising of different biotopes (Table 4.1).

Table 4.1 Biotope sensitivities to substratum loss, abrasion & physical disturbance, smothering, and increased nutrients

Littoral	Substratum Loss	Abrasion & Physical Disturbance	Smothering	Changes in Nutrients Levels
LGS.BarSh (LGS.BarSnd)	Low	Very Low	Tolerant	Not Relevant
LGS.BarSnd	Low	Very Low	Tolerant	Not Relevant
LGS.Tal	Low	Not Sensitive	Not Sensitive	Not Relevant
SLR.Fves (MLR.BF)	Moderate	Moderate	Low	Low
LR.G	Low	Low	Low	Not Sensitive
SLR.Pel (MLR.BF)	Moderate	Moderate	Low	Low
SLR.Ephx	No Review	No Review	No Review	No Review
LR.Ver.B (LR.YG)	Very High	High	Very Low	High
LR.FK (MIR.Ldig.Ldig)	Moderate	Low	Low	Low
LR.Cor.Cys (LR.Cor)	Moderate	Low	Low	Very Low
LR.Cor.Bif (LR.Cor)	Moderate	Low	Low	Very Low
ELR.BpatSem (ELR.Bpat)	Moderate	Moderate	Moderate	Low
LR.Cor	Moderate	Low	Low	Very Low
LGS.AP.P (LGS.Aeur)	Moderate	Very Low	Very Low	Moderate
Sublittoral				
IGS.Mob (IGS.NcirBat)	Low	Very Low	Not Sensitive	Not Sensitive
EIR.LhypR.Ft (EIR.LhypR)	Moderate	Moderate	Low	Moderate
SIR.Lsac.Ldig (SIR.Lsac.Pk)	Moderate	Low	Low	Low
MIR.Ldig (MIR.Ldig.Ldig)	Moderate	Low	Low	Low
MLR.Fser (MLR.B.F)	Moderate	Moderate	Low	Low

Source: marlin.ac.uk

	Very High		High		Moderate
	Low		Very Low		Tolerant / Not Sensitive / Not Relevant

Where sensitivity data for a particular biotope was not available the sensitivity of a similar biotope, as indicated on the MarLIN web site, is shown instead (biotopes shown in brackets are proxies for those observed during the biological surveys).

Sensitivity to perturbation is a function of the intolerance to environmental change and the subsequent recoverability of a particular biotope or species. Definitions of intolerance, recoverability and sensitivity are shown below.

- *'Intolerance'* is the susceptibility of a habitat, community or species (i.e. the components of a biotope) to damage, or death, from an external factor. Intolerance must be assessed relative to change in a specific factor.
- *'Recoverability'* is the ability of a habitat, community, or species (i.e. the components of a biotope) to return to a state close to that which existed before the activity or event caused change.
- *'Sensitivity'* is dependent on the intolerance of a species or habitat to damage from an external factor and the time taken for its subsequent recovery. For example, a very sensitive species or habitat is one that is very adversely affected by an external factor arising from human activities or natural events (killed/destroyed, 'high' intolerance) and is expected to recover over a very long period of time, i.e. >10 or up to 25 years ('low'; recoverability). Intolerance and hence sensitivity must be assessed relative to change in a specific factor.

4.4.1 Littoral

Habitat removal, physical abrasion and smothering

Removal of the substratum will result in the complete loss of flora and fauna along the pipeline route. However, this impact will be highly localised being limited to the narrow excavated trench. Once filled with concrete the surface of the trench will be recolonised, although the uniform topography of this material is such that the diversity of the recolonised community will be lower than would be expected if rock armouring were used. Furthermore, no substantial biological risk is thought to be associated with leachates and bioaccumulation of toxins from this material (Hill *et al.*, 1998).

Table 4.1 highlights, in particular, the sensitivity of the biotope, L.R.Ver.B, which comprises the lichen *Verrucaria maura* and sparse barnacles on exposed littoral fringe rock. This biotope is thought to be very highly sensitive to substratum loss and highly sensitive to both abrasion and physical disturbance and changes in nutrient levels. However, despite the apparent sensitivity of this biotope, it is not thought likely to be significantly affected as it is located some 250m from the proposed pipeline route.

While all the biotopes located along the pipeline route (See Appendix C, Figure 1) will be affected by habitat removal, the sensitivity of each biotope to substrate removal varies (Table 4.1). This reflects, in the main, the differing rates of recolonisation. None of the biotopes were classed as highly sensitive to habitat removal, with four classed as moderately sensitive (SLR.Fves, SLR.Pel, LR.FK & ELR.BpatSem) and two of low sensitivity (LGS.BarSh & LR.G). Overall, habitat removal is expected to be of minor significance given the limited extent of the impact and the likelihood of recolonisation.

The sensitivity of biotopes to abrasion by the operation of the jack-up rig and excavator and, to a wider degree by movement of construction plant is similar to that of habitat removal, albeit of lower severity. Abrasion may damage or kill littoral organisms, which must then recover or recolonise before the habitat can be restored. The sensitivity to abrasion is therefore a function of their ability to recover or recolonise the habitat. Of the biotopes located within 100m of the proposed pipeline (See Appendix c, Figure 1), three are classed as moderately sensitive to (SLR.Fves, SLR.Pel, & ELR.BpatSem) to abrasion and physical disturbance, two low (LR.G & LR.FK) and two very low (LGS.BarSh & LGS.BarSnd) (Table 4.1). The effect of physical abrasion of littoral organisms is, therefore, considered to be of minor significance.

Smothering from material released during trench excavation is unlikely to significantly impact the littoral environment. Intertidal communities may be subject to limited smothering, however, this should be very localised and short-lived. Littoral organisms are typically well adapted to

periodic smothering, as evidenced in Table 4.1 where the majority of surveyed biotopes are classed as low sensitivity to smothering and just one biotope as moderate (ELR.BpatSem).

Intertidal communities tend to be more resilient to physical damage than subtidal communities because of their adaptation to the harsh natural processes. None of the intertidal organisms identified in the survey are particularly sensitive to physical disturbance (e.g. habitat removal, abrasion and smothering). In general, intertidal organisms are adapted to frequent disturbance and recolonisation and re-growth of communities is often rapid (Hill *et al.* 1998).

Increased nutrients

The marine environment has a capacity to absorb and recycle a considerable amount of natural waste products (those produced by marine animals themselves, for example) via well-developed detritivore communities (Birkett *et al*, 1998). The literature suggests that increased nutrients result in predominantly indirect effects on species or communities, e.g. overgrowth by algal mats or the toxic effects of algal blooms (Birkett *et al.,* 1998; Hill *et al.,* 1998).

Hill *et al* (1998) state that the most severe effects of effluent disposal occur in semi-enclosed areas such as estuaries and sheltered bays. Effects on high-energy rocky shores are negligible, while effects on low- to medium-energy rocky shores can be more pronounced. Water movement limits the build up of particulates and prevents eutrophication. Thus, the ecological effects of large outfalls may stretch to a few hundred metres while the effects of smaller discharges are usually confined to within about 10m of the pipe (Raffaelli & Hawkins, 1996). In determining the necessary level of treatment for outfalls, the UWWT Regulations use the following size classes, <10,000 pe, 10,000-15000 pe and >15,000 pe. The proposed Quilty WWTP is to serve 1,230 pe and, as such, must be considered a small discharge, according with the above estimate of impacts being limited to within 10m of the pipe. The shoreline is also considered to be moderately exposed and is, therefore, not likely to be particularly susceptible to eutrophication.

The specific biotopes recorded during the biological survey are not thought to be particularly sensitive to increased nutrients. Only one biotope, LR.Ver.B, is classed as highly sensitive to nutrient input. However, this biotope corresponds to the upper shore lichen zone and would not be immersed for prolonged periods, if at all. This biotope is located circa 250m from the proposed outfall route and circa 400m from the proposed discharge point. The biotope, LGS.AP.P is classed as moderately sensitive to nutrient input. This corresponds to areas of gravelly sands with *Arenicola* and other polychaetes. This biotope is circa 250m from the proposed outfall route and circa 350m from the proposed discharge point. It is therefore considered that these biotopes are unlikely to be significantly impacted by a small-scale discharge such as this. The remaining biotopes are considered to be of low or very low sensitivity or not sensitive, and are thus not considered to be likely to be impacted.

There is generally a lack of information regarding potential thresholds for effects of Nitrogen compounds in the marine environment. However, standards have been suggested by the Comprehensive Studies Task Team, set up to advise on implementation of the Urban Waste Water Treatment Directive in the UK and by OSPAR (OSPAR, 2001). These standards were used to assess the likelihood of eutrophication effects from the proposed pipeline (see Section 3.4). The results indicated that the area of water that will experience elevated nitrogen concentrations at a level that would cause any concern in terms of potential eutrophication will be small and limited to the surface boil above the discharge and a very limited area around it.

Considering the large additional secondary dilution effect the resultant nitrogen concentrations are not thought likely to have significant effects on the benthic flora and fauna in the vicinity of the pipeline.

4.4.2 Sublittoral

Impacts of the proposed pipeline in the sublittoral are analogous to those observed in the littoral. As such, reference is made to the littoral evaluation of effects to avoid excessive repetition.

Habitat removal, physical abrasion, smothering

As for the littoral environment, construction of the pipeline will cause a direct physical loss of kelp habitat along the path of the outfall, due to excavation of the trench and associated blasting activities. The placement of rock armouring over the diffuser will result in the loss of existing habitat, but will itself act as a reef like structure and provide a habitat for colonisation by epifaunal species. These attached communities will form dense turf in suitable microhabitats of the structure, providing secondary habitat and enhancing the ecology of the area. No substantial biological risk is thought to be associated with leachates and bioaccumulation of toxins from this material (Hill *et al.,* 1998). The rock armouring around the diffuser is thought unlikely to impact the hydrophysical regime as the structure will be small (standing circa 50cm proud of the seabed) in relation to the height of the water column (circa 5.2m at MLWS).

Only one biotope, SIR.Lsac.Ldig, is present along the pipeline and, therefore, likely to be directly impacted by the proposed construction. This biotope is classed as moderately sensitive to substratum loss (Table 4.1). Recovery is therefore likely to be slower than for the littoral environment. However, given the limited area affected, the likelihood of recolonisation and the provision of additional substratum through the placement of rock armouring, direct effects of the construction are considered to be of minor significance.

The area immediately adjacent to the pipeline will be subjected to physical abrasion by the jack up rig and potentially physical disturbance by blasting activities. This comprises the biotope SIR.Lsac.Ldig, which is considered to be of low sensitivity to abrasion (Table 4.1). Effects of abrasion are therefore not considered significant. Smothering is also not thought likely to cause any significant effects as all of the sublittoral biotopes recorded during biological surveys are classed as not sensitive or of low sensitivity to smothering and construction is likely to be short-term and of limited extent.

Increased nutrients

As stated for the evaluation of effects in the littoral environment, the small size of the proposed Quilty pipeline, expected to serve just 1,230 pe, and the open and moderately exposed nature of the coastline, suggest that any effects of increased nutrients would be limited to within 10m of the outfall, if at all evident.

Further examination of the sensitivities of the biotopes in the vicinity of the discharge point, support the view that any eutrophication effects will be limited. One biotope is considered not to be sensitivity to changes in nutrients, three are of low sensitivity to changes in nutrient levels (SIR.Lsac.Ldig, MIR.Ldig & MLR.Fser) while one biotope is moderately sensitive (EIR.LhypR.Ft) (Table 4.1). However, the boundary of the EIR.LhypR.Ft biotope (exposed infralittoral rock with dense kelp forest and foliose red seaweeds) is circa 50m from the proposed discharge point, and is therefore unlikely to be significantly affected.

This information combined with the expectation that elevated nitrogen concentrations, at a level that would cause any concern in terms of potential eutrophication, will be limited to the surface boil above the discharge and a very limited area around it (see Section 3.4) suggests that there is unlikely to be any significant effects of increased nutrient concentrations on the resident biological communities.

Release of Contaminants

The limited extent and short-term nature of construction activities are such that it is unlikely that any significant release of contaminant will occur, provided construction activities follow appropriate best practices.

Table 4.2 Summary of potential impacts on marine ecology

Impact	Type of impact	Probability of impact Occurring	Extent of impact	Magnitude of impact	Significance Level	Rationale
Loss of intertidal rocky reef communities due to pipeline installation	-ve	Certain	Local	High	Minor	Physical loss will be localised but intertidal reef communities are resilient to disturbance and recolonisation of mobile species will occur rapidly post construction. Sedentary species will recolonise during the next breeding cycle.
Physical damage to subtidal communities from trench digging and use of jack up rig	-ve	Certain	Local	High	Minor	Kelp communities will be damaged but after the disturbance recolonisation of juvenile species will occur rapidly.
Permanent loss of subtidal habitats where rock armouring is placed over diffuser	-ve/+ve	Certain	Local	High	Not Sig	Existing rocky reef habitat will be removed but will be replaced by new rocky habitat, which will become recolonised epifauna.
Damage to marine ecology through an increase in suspended sediment loads around the pipeline	-ve	Unlikely	Local	Low	Not Sig	Any increase will be short lived and localised.

Impact	Type of impact	Probability of impact Occurring	Extent of impact	Magnitude of impact	Significance Level	Rationale
Changes in marine water quality due to sewage effluent entering the marine environment impacting benthic communities.	-ve	Certain	Local	Med	Not Sig	Effluent will have undergone secondary treatment so nutrient levels will not pose a high threat of eutrophication. Dispersion will reduce nutrient levels to below threshold levels for impact. [2]
Changes to hydrophysical regime and sediment patterns	-ve	Unlikely	Local	High	Not Sig	The rock armouring will stand only around 50cm proud of the seabed and any rocks that are not needed to secure pipeline will be removed.
Damage to benthic communities from the discharge of chemicals from construction boats	-ve	Unlikely	Local	Low	Not Sig	Strict guidelines will be followed during construction to reduce the likelihood of spillages occurring.

Key:	Type	Probability	Extent	Magnitude	Significance
	-ve = Negative	Certain	Local	High	Major
	+ve = Positive	Likely	Regional	Medium	Minor
	? = Unknown	Unlikely		Low	Not Significant (Not Sig)
	▲= Neutral			None	

[2] Note: Impacts from increased nutrient input have been downgraded since the previous Environmental Assessment Report (Entec, 2003) as a result of nutrient dilution calculations which were not available at time of writing the previous report.

4.5 Mitigation of potential impacts

The following table details suggested mitigation measures to be incorporated into the proposed development for the purpose of minimising impacts.

Table 4.3 Suggested mitigation of potential impacts.

Impact	Suggested mitigation to be incorporated into the proposed development	Extent to which impact mitigated[1]	Items agreed with developer
Construction			
Site working practices for construction of outfall			
Disturbance to intertidal marine ecology whilst pipeline is transported from land to jack up rig.	• Disturbance should be confined to the upper shore where possible as this area is less sensitive to physical disturbance than the lower shore.	Substantially	No
Method of construction			
Damage to intertidal and subtidal marine ecology	• Use of Jackup rig during construction to minimise impact footprint in the intertidal.	Substantially	No
	• Accurate placing of rock to weigh down the pipeline and to place over the diffuser. Remove rock armouring that is not needed to secure pipeline	Substantially	No
Operation			
Contamination of marine habitats (sedimentary shores and exposed rocky shore)	• Fitting of a 2 port diffuser to dissipate energy of the flow and aid further dispersion of the effluent in the bulk ocean water.	Substantially	No

Note - [1] Key to predicted success of mitigation

Fully - Impact fully mitigated and no effects predicted.
Substantially - Mitigation would be successful at reducing impact in most cases. Some effects possible under abnormal conditions (e.g. extreme weather conditions).
Partially - Mitigation would be successful at reducing impacts, but some effects likely.

5. Marine mammals

5.1 Methods and sources of information

The assessment of potential impacts of blasting activities on marine mammals comprised the following: review of relevant databases for marine mammal sightings and description of the usage of the area; review of literature on the effects of blasting activities on marine mammals; modelling of the likely propagation of sound from blasting activities, based on a range of typical sizes of explosives up to a maximum size (including figures); identification of what reasonable measures might be necessary to mitigate impacts on marine mammals.

5.2 Baseline description

A total of 13 species of marine mammal are thought to breed in Irish waters and a further 14 occur seasonally or are vagrants (Berrow, 2001).

5.2.1 Seals

Two species breed in Irish waters: common seal and grey seal. The grey seal is more abundant and widespread in Ireland than the common seal but both occur near the construction area. A recent review of seal survey data collected by the National Parks and Wildlife Service was carried out by Lyons (2004). An All-Ireland common seal survey was carried out in 2002-2003 using infra-red photography (Cronin *et al.*, 2004). These reports provided reliable and up to date abundance estimates and distribution maps.

Common seal *(Phoca vitulina)*

Common seal feed at sea but regularly haul out on rocky shores or inter-tidal sandbanks to rest, or to give birth and to suckle their pups. Many of the most important haul-out areas are along the west coast of Ireland. Although young seals travel distances of several hundred kilometres, adults appear to remain faithful to favoured haul-out areas from year to year. The particular sites used may, however, vary with the seasons. Common seals travel up to 50km from haul-out sites to feed and may remain at sea for several days (Lyons, 2004).

An All-Ireland estimate of the total population of common seals, calculated from surveys undertaken in 2002 and 2003 was calculated as 4,153 with 2,905 in the Republic (Cronin *et al.*, 2004). Common seal surveys by the NWPS have mostly been undertaken in July. Five main centres of population have been identified: Bantry Bay (403; 2003, mainly Glengarriff Harbour), Kenmare River (386; 2003), inner Galway Bay (217; 2003), Sligo Bay (275; 2001), Rooneys Island, inner Donegal Bay (181; 2003). Population increases have been reported at most sites between 1978 and 2003.

Although surveys in Galway Bay were spread over a wide geographical area, whole bay estimates are not available for many years (Lyons, 2004). The most recent population estimate for Galway Bay was in 1990 and 1991 and was calculated at between 300 and 400 common seals. The recent aerial survey estimated an inner Galway Bay population of 217 common

seals. In total eleven sites with common seals were recorded in County Clare. Ten of these were in North Clare although one, Mutton Island, is adjacent to the construction site. It is likely that these seals form part of the inner Galway Bay population, as there appears to be a greater degree of population flux in inner Galway Bay than at other coastal areas.

Abundance estimates from Cronin *et al.* (2004) showed 17 common seals were present on Mutton Island in August 2003 (Table 5.1). Thus Mutton Island provided a haul out site for 0.6% of the total common seal population in the Republic or 7.8% of the inner Galway Bay population. Up to 35 common seals have been recorded on Mutton Island and at Lurga Point during the late summer and autumn (Wilson and Berrow, 2003) suggesting that the proportion of the Galway Bay population using the area might be higher (up to 15%). Thus relative to the rest of inner Galway Bay and the Republic of Ireland, the importance of Mutton Island is considered to be locally significant.

Table 5.1 Common and grey seal data from Liscannor Bay during the All-Ireland common seal survey

Date	Survey region	Location	No. of seals	*EASTINGS*	*NORTHINGS*
Common seal (*Phoca vitulina*)					
16/08/2003	Liscannor Bay	Mutton Island	17	989	1746
Grey seal (*Halichoerus grypus*)					
16/08/2003	Liscannor Bay	Lahinch	2	1091	1869
16/08/2003	Liscannor Bay	Mutton Island	9	975	1723

(from Cronin *et al.*, 2004)

Grey seal *(Halichoerus grypus)*

Grey seals in Ireland are widespread but the greatest concentrations are found on exposed south-western, western and northern coasts (Lyons, 2004). Between the tides they haul themselves out onto rocks, usually on uninhabited offshore islands, though some haul-outs are on secluded mainland beaches. Grey seals are gregarious at these haul-outs, sometimes forming large groups of several hundred animals, especially when moulting their fur in the spring. In the autumn they congregate at traditional sites on land to breed. The timing of births varies but peak pup production is during October-November (Kiely & Myers, 1998), when they remain on land and suckle for 18-21 days.

The largest populations of grey seal on the Irish Coast are found on the Blasket Islands, Inishkea Island group, the Saltees and the Raven (both off County Wexford) (Lyons, 2004). A number of other sites reported aggregations of grey seals including Mutton Island, County Clare, however, no estimates were provided in Lyons (2004). Cronin *et al.* (2004) recorded nine seals on Mutton Island in August 2003 (Table 5.1), although it is unlikely these seals were breeding. No grey seal pups have been reported on Mutton Island by Lyons (2004), however, Lockley

(1966) recorded 20 adults and an unknown number of pups at Mutton Island in 1964-65, suggesting that they have pupped on Mutton Island in the past.

5.2.2 Cetaceans

Of the twenty-three species of cetacean recorded in Ireland, seven have been reported off the County Clare coast, adjacent to the construction site (Table 5.2). Data on the distribution and abundance of cetaceans in Ireland is limited. There have been two dedicated sightings surveys, which have derived abundance estimates. One of these, the SIAR survey in 2001, surveyed the west coast of Ireland, although the closest point was >50km from the study site (ÓCadhla *et al.*, 2004). Thus no abundance estimates for cetaceans adjacent to the construction site have been identified.

The joint Atlas of Cetaceans in NW European Waters (Reid *et al.,* 2003) presents sightings data from 61,000 hours at sea and 31,000 sightings but coverage off the area of interest was very low. The atlas shows that harbour porpoise, common dolphin and bottlenose dolphin are seen off County Clare.

The Irish Whale and Dolphin Group (IWDG) manage a sighting and stranding database, which is the most comprehensive and up to date source of information on cetaceans in Ireland. A review of sightings and strandings on this database was undertaken, extracting records of stranded animals from Doonbeg to Rineen since 1950, within 10km of the construction site, and sighting records from Doonbeg to Liscannor Bay between 1991 and 2004. The IWDG database contained 30 stranding records and 27 sighting records (see Appendix E, Tables 1 and 2 for a full list of records). Only two species were observed adjacent to the construction area (Table 5.2). Although casual sightings are few, significant sightings effort has been employed from Dereen, around 40km north of Quilty, with over 315 hours of dedicated cetacean watching (Berrow *et al.*, 2002).

Table 5.2 Cetacean sightings and strandings adjacent to the construction site

Species	Sightings		Strandings
	Observations	Abundances	Abundances
Bottlenose dolphin (*Tursiops truncatus*)	23	4-15	3
Common dolphin (*Delphinus delphis*)	2	8-20	10
Pilot whale (*Globicephala melas*)	0	0	6
Harbour porpoise (*Phocoena phocoena*)	0	0	3
Cuvier's beaked whale (*Ziphius cavirostris*)	0	0	3
Sperm whale (*Physeter macrocephalus*)	0	0	2
Risso's dolphin (*Grampus griseus*)	0	0	1
Small whale (not porpoise)	2	20	2
TOTAL	**27**		**30**

(source: IWDG database)

Records of stranded cetaceans are more frequent with definite records of seven species. Although there were no confirmed sighting records of harbour porpoise within 10km of the construction area, it is likely they are present but unrecorded, as they can be difficult to observe in high sea-states or swell. Species such as sperm and pilot whales and Cuvier's beaked whales occur offshore and reflect the sites' location on the western seaboard. It is likely that these moribund animals floated in from well outside the construction area.

This review suggests bottlenose dolphin and common dolphin are the most frequently encountered species in or adjacent to the study site and harbour porpoise, although not sighted are also likely to regularly occur.

Bottlenose dolphin *(Tursiops truncatus)*

Bottlenose dolphins have been recorded in all Irish coastal waters but some of the largest concentrations in Europe occur along the western seaboard of Ireland. The bottlenose dolphin has frequently been seen adjacent to the construction site. Bottlenose dolphins have previously been sighted at a rate of 0.05-0.14 sightings per 100 minutes, between March and October (Berrow *et al.*, 2002). Bottlenose dolphins are typically a coastal species and often show high site fidelity, although an offshore eco-type may occur in Ireland, thus we might expect them to remain in the area for extended periods. Group size tends to be less than 20 individuals although up to 70 have been reported off County Clare. The bottlenose dolphin is listed on Annex II of the Habitats Directive and thus requires special conservation efforts. A resident group occurs in the Shannon estuary all year around (Berrow *et al.*, 1996), and the estuary, which is a candidate Special Area of Conservation is the only protected site in Ireland for which this species is listed as a reason for selection.

Common dolphin *(Delphinus delphis)*

Common dolphins are found off all Irish coastal waters but mainly off the south and south-west. Densities in the summer in the approaches to the Shannon estuary may reach 2.23 animals per hour (Wall, 2004). Common dolphins are regularly seen between the Aran Islands and Loop Head and usually occur further offshore than bottlenose dolphins (Berrow *et al.*, 2002). Group size can vary from around 6 to over 200-300, with larger group sizes tending to be recorded in the autumn and winter. They may travel large distances especially seasonally with changes in the distribution of preferred prey species such as herring and mackerel.

Harbour porpoise *(Phocoena phocoena)*

The harbour porpoise is widespread and abundant in all Irish coastal waters but can be difficult to observe in even moderate sea-states and swell. They can be observed all year round although inshore sightings peak between June and July. Sightings of harbour porpoise, at rates of 0.05-0.08 sightings per 100 minutes, have previously been recorded in January, April and October (Berrow *et al.*, 2002). Harbour porpoise are listed on Annex II of the Habitats Directive and thus require special conservation efforts. Two sites (Roaringwater Bay, County Cork and the Blasket Islands, County Kerry) have been designated as candidate Special Areas of Conservation for this species.

5.3 Potential impacts on marine mammals

Literature on the effect of explosives on marine mammals is limited. There is considerable interest in the effects of seismic and other acoustic survey techniques (see reviews by Richardson *et al.*, 1995 and Gordon *et al.*, 1998), but less on the impacts of explosives. For example, Keevin and Hempen (1997) provided a list of 173 references on the environmental effects of underwater explosions with only seven directly concerned with the impact on marine mammals.

5.3.1 Explosives

The three most important aspects of blasting are the detonation, the nature of media transmitting the blast and the effects of the blast on the ambient environment (Keevin and Hempen, 1997). The detonation ceases at the boundary with the medium containing the explosive and the shock wave passes into the medium. Thermal and detonation effects are only important near the explosives, while the shock wave is the primary cause of damage to aquatic life.

The compression wave at any location in the water column is related to the shock pressure in the detonating material. The maximum pressure (P_m) within the water is the principal cause of hazard to aquatic life, and is related to the detonation pressure (P_d) and the detonation velocity (V_e) (Keevin and Hempen, 1997).

Explosives for removing solids are usually detonated within boreholes and not on the surface. Thus the sound pressure wave travels most rapidly down the centreline of the explosive column. The shock wave from the detonation is converted into outward kinetic energy of the water medium. This wave is followed by a surge and they both contribute to the "shock path". The velocity of this pressure wave is influenced by water depth, temperature and salinity. The sound pressure wave takes a declining exponential form with radial distance from the explosive (Keevin and Hempen, 1997). Thus, the blast effect will be the same at twice the distance for 16kg compared with 2kg of explosives.

5.3.2 Marine Mammals

Although the source level of pressure waves can be relatively easily calculated it is more difficult to predict the received level as the sensitivity of marine mammals to different frequencies is poorly understood. The sensitivity of marine mammals depends on their specific audiogram for example harbour porpoises are sensitive from 3-130kHz, with peak sensitivity at 125-130kHz and bottlenose dolphins from 15-110kHz with peak sensitivity at 5kHz. Common seals are sensitive from 4-45kHz (peak sensitivity at 32kHz) and grey seals from 8-40kHz. For comparison, humans are sensitive only to around 16-18kHz.

Potential impacts on marine mammals may range from physical damage, including temporary and permanent threshold shift (deafness), to perceptual (masking biologically significant noises) and behavioural impacts (temporary or permanent displacement and stress) as well as indirect effects (reduced prey availability) (Gordon *et al.*, 1998).

Physical: The damage that shock waves from explosives could cause to marine mammals has been explored using submerged terrestrial animals and dolphin carcasses. Indirect physical damage can be caused by sound-induced growth of bubbles but this tends to preferentially affect deep diving species.

Perceptual: If the frequencies produced by the sound source overlap with frequencies used for echo-location or communication there is potential for interference and masking of these important vocalisations. In the present case, blasting is likely to be of a short duration thus perceptual impacts are not likely to be significant.

Behavioural: The greatest potential impact on marine mammals from blasting is on their behaviour. Displacement of individuals from their preferred feeding, breeding or resting areas may occur. If the impact is great this displacement may be long term or permanent. This assessment seeks to minimise this risk as much as possible. Stress may also induces physiological effects (increased heart and respiratory rate).

Indirect effects: These include damage or displacement of prey species and other essential aspects of the life history of marine mammals. In the present case, blasting is likely to be of short duration and local, thus indirect effects are not likely to be significant.

Auditory thresholds

There is limited information in the scientific literature describing the physiological effects of noise on marine mammals, particularly at species level. A summary of available information is given below.

Crum and Mayo (1996) calculated that exposure of humans or marine mammals to 500Hz sounds at sound pressure levels of 210dB re. 1μPa could cause bubble growth to occur and suggested that this could theoretically induce the 'bends' in marine mammals. They considered that this effect was unlikely at sound pressure levels below 190dB re. 1μPa.

Exposure to noise of sufficiently high intensity causes a reduction in hearing sensitivity. This can be a temporary threshold shift, with recovery after minutes or hours, or a permanent threshold shift with no recovery. Kastak *et al.*, (1999) investigated the development of temporary threshold shift after exposure to octave band noise in elephant seals, harbour (common) seals and Californian sea lions, while Schlundt *et al.*, (2000) studied exposure to intense tonal pulses in bottlenose dolphins (*Tursiops truncatus*) and beluga whales.

Finneran *et al.*, (2000) measured the masked underwater hearing threshold of dolphins after exposure to sounds with waveforms generated to resemble those of distant explosions. Pulses from charges ranging from 5-500kg Hex at ranges of 1.5 to 55.6km were simulated, with the highest exposure level generated being equivalent to 500kg at 1.7km. No threshold shifts were observed after any of these exposures. Disruption of trained behaviour began to occur at exposures equivalent to 500kg Hex at 9.3km and 5kg TNT (trinitrotoluene) at 1.5km for the dolphins and at 500kg Hex at 1.9km for belugas.

Schlundt *et al.*, (2000) carried out a comprehensive study involving experiments with five individual bottlenose dolphins and two belugas. The hearing thresholds of the animals were measured before and after exposure to 1-second tones at 0.4, 3, 10, 20, and 75kHz. The levels required to cause a 6dB reduction in sensitivity for short exposures at these frequencies were between 192 and 201dB. At 400Hz, where sensitivity was lowest, no animals showed evidence of threshold shifts.

In summary, the above information shows that underwater noise can have physiological effects on the auditory thresholds of marine mammals, although information on the specific sound pressure levels that may cause these effects is ambiguous..

5.4 Evaluation of Effects

Ward (1968) (cited in Richardson *et al.*, 1995) investigated human damage risk criteria for impulse noise in air, based on empirical observations of temporary threshold shift, and derived a predictive formula for permanent threshold shift using peak pressure levels, pulse duration and number of pulses as parameters. For pulses with a certain peak pressure, risk was found to increase with both the number and duration of pulses. According to Ward's formula, peak pressure threshold for damage diminishes by 2dB for each doubling of pulse length, up to a pulse length of 200ms, beyond which there is no further decrease. As the number of pulses is reduced, the peak pressure threshold increases, by 5dB per 10-fold reduction in pulse number.

Thompson *et al.*, (1998) conducted controlled exposure experiments on individual seals fitted with telemetry devices using small airguns with source levels of 215-224dB re. 1µPa p-p). The telemetry devices allowed the movement, dive behaviour and swim speeds of the seals to be monitored, providing detailed data on their responses to seismic pulses. Two common seals showed evidence of immediate fright responses when playbacks started. Their heart rates decreased dramatically from 35-45 beats/min to 5-10 beats/min. However, these responses were short-lived and following a typical surfacing tachycardia no further dramatic drops in heart rate were observed.

McCauley *et al.*, (2000) suggested that animals must be able to cope physiologically with the intensity of their own sounds. It has been further suggested that some features of cetacean ears render them less vulnerable to acoustic damage than those of terrestrial mammals, although there is no direct evidence to support this. Calculations make the assumption that the damaging effect of a pulse is directly proportional to its energy.

Following these and other studies quoted in Richardson *et al.*, (1995) and Gordon *et al.*, (1998) a potential risk matrix has been produced (Berrow, 2004) (Table 5.3).

Table 5.3 Crude risk matrix for received sound pressure for seals and cetaceans

Potential Effect	Received levels	Seals	Cetaceans
	(dB re. 1µPa)	Likely risk	Likely risk
Physical damage: PTS	210+	M	M
Physical damage: TTS	192-201	H	H
Perceptual	-	L	L
Behavioural	178	H	H
Stress	153	M	M
Indirect	-	L	L

Likely risk: H = High, M = Medium, L = Low. PTS = Permanent Threshold Shift, TTS = Temporary Threshold Shift.

For the present assessment it is recommended that a maximum threshold of received sound pressure of 150dB re. 1µPa is not exceeded for both seals and cetaceans. This should minimise the likelihood of significant impacts on marine mammals.

5.4.1 Modelling of the likely propagation of sound from blasting

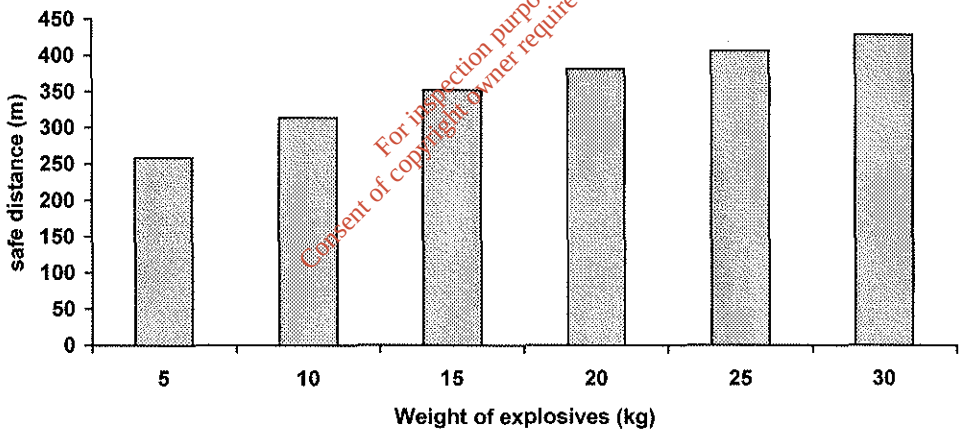
As a detailed method statement for blasting activities is not available at this time, a generic assessment of the likely potential effects has been undertaken. The assessment has therefore attempted to set maximum thresholds for explosives use so that the received sound pressure levels for marine mammals remains at a safe level (<150dB re. 1µPa).

There are currently no accepted equations for modelling the likely sound propagation from an explosion. Young (1991) developed equations to estimate marine mammal safe ranges based on experiments with land mammals which recorded observations of physical injury (physical damage). He suggested several equations, including the following for an adult dolphin in 60m water depth, which he felt were useful for preliminary planning (Figure 5.1):

Range (in metres) = 165 $W^{0.28}$

where W is the weight of the explosive in kg

Figure 5.1 Relationship between explosive charge and safe distance for physiological effects



Source: Young (1991)

He suggested that these equations were technically correct but did not account for all possible conditions or environments. Non-physical impacts, such as effects on the behaviour of marine mammals, were also not included.

Hill (1978) developed a model to predict lethal ranges for marine mammals, utilising information on the depth of the target animal, depth of detonation and weight of the charge. However, this information is not available and, as such, this model cannot be used.

In order to assess the potential impact of blasting it is necessary to know the sound pressure level of the source at the time of detonation. As these data are not currently available predictions have been based on a number of assumptions.

Urick (1975) states that in shallow water, the medium in which sound propagates is bounded by the water surface and the seabed. The surface reflects all of the incident energy. If the seabed is hard and smooth it reflects most of the incident energy. Under these conditions the sound energy only spreads out horizontally and is constrained by the two reflecting surfaces vertically (the seabed and water surface). This corresponds to cylindrical spreading. In reality the seabed is rarely a good reflector and so a good approximation for the sound level is given by:

$L_r = L_s - 10 \times \log_{10} R$ from Urick (1975)

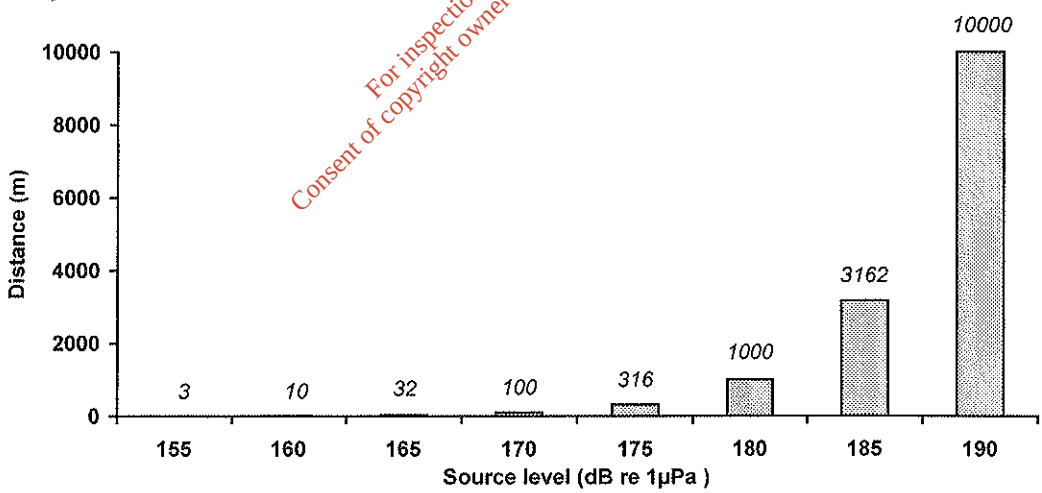
Where L_r is the received signal level in dB re. 1µPa

L_s is the source level in dB re. 1µPa @ 1m

R is the distance in metres

Thus to determine R we can use: $\log_{10} R = \frac{L_s - L_r}{10}$

Figure 5.2. Distance (metres) at which a signal level of 150dB re. 1µPa is received with increasing source level

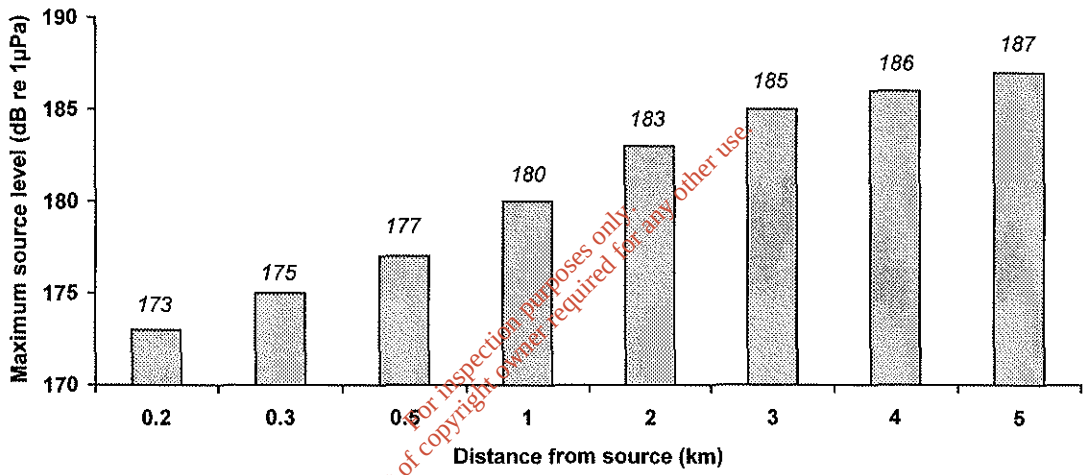


If it is assumed that an upper maximum limit of received sound pressure of 150dB re. 1µPa is acceptable it is possible to predict distance (R) based on a range of potential source levels (Figure 5.2). This relationship is exponential, thus for a source level of 170dB re. 1µPa a marine mammal should be 100m from the explosive while for a source level of 175dB re. 1µPa (a 5dB increase) the safe distance is increases three-fold to 316m.

However, as information on the actual source level is not available an alternative approach is necessary to set maximum source level thresholds based on a realistic and practical 'safe distance', which is both enforceable and takes account of the likely distribution of marine mammals. If it is assumed that the maximum received source level should be limited to 150dB re. 1µPa then it is possible to explore how the maximum permitted source level varies with distance.

As evident from Figure 5.3 as the distance from the source increases the maximum permitted source level increases, i.e. the larger the explosion permitted. Thus if a distance of 1km is considered safe for marine mammal exposure this would permit a maximum source level of 180dB re. 1µPa. If 5km were considered a safe distance then the maximum permitted source level would be 187dB re. 1µPa.

Figure 5.3 Increase in maximum permitted source level with distance from source (assuming maximum receiving level of 150dB re 1µPa)



5.4.2 Determination of safe distances

In reality it can be difficult to ensure that there are no marine mammals within a certain 'safe distance' prior to blasting. It is therefore important to consider what area can be surveyed effectively to be reasonably sure there are no marine mammals occurring, within a given zone. At the construction site the only suitable terrestrial vantage point is Lurga Point, which is around 5-10m above sea level. Thus, the effective search area using binoculars and a telescope is limited to <5km in favourable weather conditions (sea-state <2). Should the sea-state be >2 then this distance might decrease to 0.5-1km for cetaceans. There is generally an acceptance that cetaceans are easier to detect than seals and, as such, even a watching brief cannot definitively conclude the absence of these species from the impact zone.

In determining what 'safe distance' should be used, it is useful to consider other instances where "safe distances" have been used. A generic buffer zone of 2.5km is enforced in the Shannon estuary cSAC for dumping and dredging operations as part of the Disposal at Sea Licence issued by the Department of Communications, Marine and Natural Resources. This might be an appropriate 'safe distance' for cetaceans. However, Mutton Island and Lurga Point, where seals frequently haul out are approximately 1km from the proposed construction site. It may,

therefore, be more prudent to select 1km as a 'safe distance' in order to protect both seals and cetaceans. This would effectively limit the use of explosives to a maximum source sound level of 180dB re. 1µPa.

It is proposed that a watching brief should be undertaken by a suitably qualified marine mammal expert. The area should be scanned for a minimum of 30 minutes prior to blasting. If cetaceans or seals are observed within 1km of the construction site then blasting should not be permitted. Should this occur then blasting should not recommence until 30 minutes have elapsed with no sightings. The presence of seals is potentially more disruptive as seals are more likely to remain in the vicinity of the construction area if disturbed. Additional measures such as herding them away from the site with a boat could be attempted but might not necessarily be successful.

If the proposed safe distances are imposed during blasting activities, so that the received sound levels for marine mammals is <150dB re. 1µPa, then the literature suggests that no significant effects are likely to be seen on marine mammals. However, it is not possible to be completely sure that no marine mammals are present within the safe distance. The impact of blasting activities on marine mammals is therefore considered to be of minor significance. It should be noted that the duration of blasting activities is likely to be in the region of 1-2 weeks.

Table 5.4 Summary of potential impacts on marine mammals

Impact	Type of impact	Probability of impact Occurring	Extent of impact	Magnitude of impact	Significance Level	Rationale
Physiological impact						
Blasting activities may cause physiological damage to cetaceans in the vicinity of the proposed pipeline	-ve	Unlikely	Local	High	Minor	A watching brief to monitor cetaceans and enforcing a 1km 'safe distance' for cetaceans should ensure that they do not receive high enough levels of sound to cause impact. However, it is not possible to be certain that the area is free from cetaceans at the time of construction.
Blasting activities may cause physiological damage to seals in the vicinity of the proposed pipeline	-ve	Unlikely	Local	High	Minor	A watching brief to monitoring seals and enforcing a 1km 'safe distance' for seals should ensure that they do not receive high enough levels of sound to cause impact. However, it is not possible to be certain that the area is free from seals at the time of construction.

Impact	Type of impact	Probability of impact Occurring	Extent of impact	Magnitude of impact	Significance Level	Rationale
Behavioural impact						
Blasting activities may cause behavioural impacts on cetaceans by altering breeding and foraging behaviour.	-ve	Likely	Local	Medium	Minor	The area is not known to be of high importance for breeding and foraging. Thus alterations in behaviour are not likely to affect health survivorship and populations.
Blasting activities may cause behavioural impacts on seals by altering breeding and foraging behaviour.	-ve	Likely	Local	Medium	Minor	The area is not known to be of high importance for breeding and foraging. Thus alterations in behaviour are not likely to affect health survivorship and populations.

Key:	Type	Probability	Extent	Magnitude	Significance
	-ve = Negative	Certain	Local	High	Major
	+ve = Positive	Likely	Regional	Medium	Minor
	? = Unknown	Unlikely		Low	Not Significant (Not Sig)
	▲= Neutral			None	

5.5 Potential Mitigation

A number of additional mitigation measures are available to minimise the impact of the use of explosives on marine mammals. Common and bottlenose dolphins (*Delphinus Delphis* and *Tursiops truncatus* respectively) and harbour porpoises (*Phocoena phocoena*) are the most likely cetaceans to be found in the area and both species of seal, grey and common (*Halichoerus grypus* and *Phoca vitulina*), breed in Ireland. It is possible that seals may be breeding at Mutton Island, 1km away from the construction site, during June-July and between August-November.

Potential mitigation measures include:

i) Reduce pressure waveform: any attempt to reduce the pressure waveform will reduce the potential exposure to marine mammals.

ii) Shield sound pressure wave from marine mammals: this may be achieved by creating air bubble curtains, but this option is not practical or necessary for such a short duration.

iii) Remove/scare marine mammals from the area during blasting: scarers such as seal bombs or pingers could be used to scare marine mammals from the area. Scarers themselves might conceivably cause damage not only to the marine mammals but other marine life in the area. The general consensus is that they startle the animals, at first, often inducing them to move away from the area but that this reaction wanes with time and the animals become tolerant of the scarers. However, given that blasting should be completed in around 1-2 weeks, this could be a successful option.

iv) Avoid blasting during periods when marine mammals are in the area: this is the simplest method to protect marine mammals. This can be seasonal if species are only present at certain times of the year or on a shorter timescale (e.g. diel or tidal cycle). In this case it would be beneficial to avoid

v) The explosive charges should be placed within a borehole, drilled into the substrate to be removed. This will limit transmission of the shock wave into the sea.

vi) The duration of blasting should be minimised. If possible a series of small explosions is preferred as the cumulative effect of this is likely to be less than fewer, larger explosions. It is also advisable that the minimum required explosive charge size should be used.

In assessing these mitigation measures a number of assumptions have been made, in particular that only a small number of detonations (the minimum necessary) are planned over a short duration (1-2 weeks).

Considering the expected short duration of blasting and the unlikely event of large concentrations of marine mammals in the area options iv), v) and vi) are preferable.

The peak period for marine mammals is May to October, with the additional possibility of seals breading on Mutton Island during June-July and between August-November. For logistical reasons a summer window is likely to be preferred for outfall construction. However, it may be possible for the blasting portion of the construction work to be undertaken prior to the peak period for marine mammals, for example in April-May. Alternately, if grey seals are thought to have pupped in the area of Mutton Island (common seals are thought to be unlikely to pup on the Island) a survey could be carried out to establish whether any pups are present potentially acting as a strong attraction for adult seals to remain in the area. Should pups be present then additional mitigation could be implemented, by only undertaking blasting at low tide, when the majority of seals will be hauled-out. However, if high numbers of pups (10 or more) are present then the implementation of further mitigation measures should be considered through consultation with the National Parks and Wildlife Service, for example, the use of seal crackers or scarers or postponing blasting activities until such a time that the pups have dispersed.

Utilising environmentally sensitive methods of blasting, as outlined in points v) and vi) above, should help to further mitigate any potential adverse affects of blasting on marine mammals.

The following table details suggested mitigation measures to be incorporated into the proposed development for the purpose of minimising impacts (Table 5.5).

Table 5.5 Suggested mitigation of potential impacts.

Impact	Suggested mitigation to be incorporated into the proposed development	Extent to which impact mitigated[1]	Items agreed with developer
Physiological & behavioural impact			
Blasting methods			
Blasting may cause physical damage to cetaceans in the vicinity of the proposed pipeline and affect their behaviour by altering breeding and foraging behaviour.	▪ The duration of blasting should be minimised. If possible a series of small explosions is preferred as the cumulative effect of this is likely to be less than fewer, larger explosions. It is also advisable that the minimum required charge size should be used.	Partially	No
	▪ The explosive charges should be placed within a borehole, drilled into the substrate to be removed. This will limit transmission of the shock wave into the sea.	Partially	No
Blasting may cause physical damage to seals in the vicinity of the proposed pipeline and affect their behaviour by altering breeding and foraging behaviour.	▪ The duration of blasting should be minimised. If possible a series of small explosions is preferred as the cumulative effect of this is likely to be less than fewer, larger explosions. It is also advisable that the minimum required charge size should be used.	Partially	No
	▪ The explosive charges should be placed within a borehole, drilled into the substrate to be removed. This will limit transmission of the shock wave into the sea.	Partially	No
Watching brief and safe distances Blasting may cause physical damage to cetaceans in the vicinity of the proposed pipeline and affect their behaviour by altering breeding and foraging behaviour.	▪ A watching brief to monitor cetaceans and enforcing a 1km 'safe distance' for cetaceans should ensure that they do not receive high enough levels of sound to cause impact. However, it is not possible to be certain that the area is free from cetaceans. See section 5.4.2 for further detail.	Partially	Yes
Blasting may cause physical damage to seals in the vicinity of the proposed pipeline and affect their behaviour by altering breeding and foraging behaviour.	▪ A watching brief to monitor seals and enforcing a 1km 'safe distance' for seals should ensure that they do not receive high enough levels of sound to cause impact. However, it is not possible to be certain that the area is free from seals. See section 5.4.2 for further detail.	Partially	Yes
Blasting timing and duration Blasting may cause physical damage to cetaceans in the vicinity of the proposed pipeline and affect their behaviour by altering breeding and	▪ If possible, blasting should not be undertaken between May and October, which is the peak period for most marine mammals in the area.	Partially	No

Impact	Suggested mitigation to be incorporated into the proposed development	Extent to which impact mitigated[1]	Items agreed with developer
foraging behaviour.			
Blasting may cause physical damage to seals in the vicinity of the proposed pipeline and affect their behaviour by altering breeding and foraging behaviour.	▪ If possible, blasting should not be undertaken between May and October, which is the peak period for most marine mammals in the area.	Partially	No
	▪ A survey of Mutton Island could be carried out prior to undertaking construction activities to assess the presence / abundance of grey seal pups, with additional mitigation implemented if pups are found. Should pups be present then blasting could be restricted to low tide (see below). However, if high numbers of pups (10 or more) are present then should be considered in consultation with the National Parks and Wildlife Service.	Partially	No
	▪ If possible, blasting should be undertaken at low tide when seals are most likely to be hauled out thus reducing their exposure to blasting related noise.	Partially	No

Note - [1] Key to predicted success of mitigation

Fully – Impact fully mitigated and no effects predicted.
Substantially - Mitigation would be successful at reducing impact in most cases. Some effects possible under abnormal conditions (e.g. extreme weather conditions).
Partially - Mitigation would be successful at reducing impacts, but some effects likely.

6. Conclusions

This addendum report details additional assessment work for the proposed Quilty pipeline, undertaken in response to specific requests from Dúchas. As a result the assessment has focussed on: calculating the projected nutrient discharge and subsequent dilution in the receiving waters; assessing the likely impacts on resident biological communities, in particular from increased nutrients, and; assessing the likely impacts of blasting activities on marine mammals.

Calculation of the predicted nutrient discharge from the Quilty pipeline was undertaken on a conservative (worst case) basis. However, the results indicate that discharged Nitrogen compounds are rapidly diluted to below threshold levels for impacts within a short distance of the point of discharge. Thus, elevated nitrogen concentrations, at a level that would cause any concern in terms of potential eutrophication, are expected to be limited to the surface boil above the discharge and a very limited area around it. There is also likely to be a large additional secondary dilution effect caused by a combination of tidal advection and wind and wave mixing. Given the predicted rapid dilution of the effluent and the general lack of sensitivity to changes in nutrients shown by biotopes in the area, it is considered unlikely that the resident biological communities will be significantly affected by eutrophication.

Both the littoral and sublittoral communities will be affected by construction activities, in particular habitat removal and abrasion caused by excavation of the trench and the movement of construction plant. However, these impacts are likely to be of limited extent and affected biotopes are at most moderately sensitive to these impacts. As such, habitat removal and abrasion are expected to be of minor significance. It is expected that effects on littoral and sublittoral communities may be further mitigated (subject to logistical and engineering constraints) by: confining disturbance to the upper shore, where possible; undertaking construction from sea; and accurate placing of rock armouring.

The marine mammal assessment identified the potential for common and bottlenose dolphins, harbour porpoises and both species of seal (grey and common seals) to occur in the area. By reviewing available literature on the impacts of explosives on marine mammals it has been possible to suggest a safe received sound level at which marine mammals are unlikely to experience physical affects or injury. From this and information on the distribution and ecology of cetaceans and seals, recommendations have been made as to safe distances for marine mammals and the corresponding maximum source sound levels for explosives use. Should these safe distances be implemented then impacts on marine mammals are likely to be of minor significance.

A number of additional suggested mitigation measures could also be utilised (subject to logistical and engineering constraints), these include: minimising the blasting duration, if possible a series of small explosions is preferable to fewer, larger explosions; using the minimum required charge size; placing explosive charges within a borehole to limit transmission of the shock wave into the sea; avoiding blasting between May and October, the peak period for most marine mammals in the area; blasting at low tide when seals are most likely to be hauled out; and using seal scarers or crackers to disperse nearby seals.

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Appendix A
Effects of Nitrogen Compounds in Marine Waters

3 Pages

This has been taken from:

Cole, S., Codling, I.D., Parr, W. and Zabel, T. (1999). Guidelines for managing water quality impacts within UK European marine sites, Report to UK Marine SAC Project.

Direct effects

In the water column, the direct effects of increases in nitrogen compounds are the toxicity of ammonia and the response of algae and other aquatic plant communities using nitrogen compounds as nutrients.

Increasing nitrogen concentrations have been shown to be related to increasing phytoplankton standing crops (reflected in increasing chlorophyll-a concentrations). Thus, a number of authors have modelled chlorophyll-a and nitrogen levels using linear regressions (e.g. Gowen *et al* 1992). The extent to which phytoplankton standing crops increase in relation to increasing nitrogen concentrations is limited by factors, such as the availability of other nutrients (phosphorus and silicon, for diatoms), the level of turbidity and measures related to the time in which the increased nitrogen levels are available to the phytoplankton for growth. Consequently, relationships between nitrogen and chlorophyll-a concentrations are often weak, but may be improved by the use of correction factors to account for tidal flow/water velocity (e.g. Lack *et al* 1990). The use of similar factors to account for regional differences in turbidity around the UK coast (e.g. Parr *et al* 1998) could greatly increase the accuracy of such models.

Although it has been postulated that elevated nutrient levels are associated with increased occurrence of *Phaeocystis* (notably in the Adriatic, but also around the UK coast) and toxic dinoflagellate blooms, there is little evidence to support such a claim. The germination of spores lying on the sediment makes it much more likely that, following an initial bloom, blooms will reoccur in subsequent years.

Macroalgae found attached to hard surfaces in estuaries and coastal waters also respond to increasing concentrations of nitrogen in the water column, resulting in increased areal coverage and density. The most common macroalgal species involved are *Enteromorpha* spp. and *Ulva* spp.

Both nutrient and organic status influence the intertidal benthic diatom community, which may provide a good indicator of trophic status (e.g. Vos and de Wolf 1993, Parr *et al* 1999, Peletier 1996) - not in terms of biomass (chl-a), but rather in terms of species composition. However, the benthic diatom community consists of several sub-communities (those diatoms which live in interstitial water, those that are firmly attached to sediment granules, and those that live in frequently-desiccated areas of sediment). It is imperative that the same sub-community is monitored on all occasions. Epiphyte communities on macroalgae may similarly provide a sensitive indicator of trophic status.

Indirect effects

The indirect effects of increased inputs of nitrogen are associated with changes in aquatic ecosystems resulting from the stimulation of algal and other plant communities in the water column and on the substratum.

While phytoplankton blooms are a natural occurrence, the nutrient enrichment of estuaries and coastal waters has been implicated in the more widespread occurrence and increased frequency and duration of such blooms. The plankton community includes consumers of phytoplankton, such as zooplankton which, in turn, are consumed by various metazoan animals (e.g. jellyfish and fish). The stimulation of phytoplankton will have knock-on effects for these consumers and

change the community composition of the plankton with the possibility that biodiversity will be reduced.

Phytoplankton blooms can affect water quality during the growth and die-off phases. During the growth phase, the diurnal variation in dissolved oxygen can be exacerbated, such that, during the day, the water column can become supersaturated with oxygen as a result of the photosynthetic activity and, during the night, oxygen can become severely depleted due to respiration. Such fluctuations in dissolved oxygen can pose problems for invertebrates and fish and can lead to fish kills (see Section C5). During the die-off phase, the superabundance of phytoplankton cells in the water column and settling onto the substratum is a source of organic carbon for aerobic bacteria which rapidly decompose this material but, in doing so, can exert an oxygen demand on the water column and on the sediments resulting in severe oxygen depletion. This can lead to sublethal and lethal effects on invertebrates and fish. These changes in water quality are likely to be greatest in semi-enclosed bodies of water with long retention times and where stratification of the water column occurs.

Phytoplankton blooms can contribute to an increase in turbidity in the water column which reduces the light availability to macroalgae and plants growing in the photic zone and resulting in a reduction in the depths of colonisation for several species (Parr *et al* 1998, Birkett *et al* 1998).

Repeated phytoplankton blooms can lead to severe degradation of the marine environment with potential adverse consequences for birds and sea mammals as the diversity and abundance of food organisms change.

The stimulation in the growth of macroalgae, particularly *Enteromorpha* and *Ulva,* in intertidal areas can result in the formation of an extensive cover of algal material (an algal mat) on the surface of exposed sediments. Above a critical standing crop, the increased amount of organic material and the reduced exchange of water between the sediment and the water column result in deoxygenation of the sediments. This can lead to a change in the infaunal benthic community and, in severe cases, the death of many benthic invertebrate species. Extensive coverage of intertidal sediments can severely diminish the feeding areas for fish and birds.

For a full range of possible direct and indirect effects of nutrient enrichment, the reader is referred to Scott *et al* 1999.

Potential effects on interest features of European marine sites

Potential effects include:

- toxicity of ammonia to invertebrates and fish in the water column;
- stimulation of phytoplankton growth in the water column of estuaries and coastal waters;
- stimulation of macroalgae, particularly *Enteromorpha* and *Ulva* spp., on the substrata of estuaries and coastal waters;
- perturbation of the plankton community, including zooplankton, other invertebrates and fish, as a result of repeated phytoplankton blooms with the potential to reduce biodiversity;

- increased fluctuation is dissolved oxygen concentrations in the water column during the growth phase of a bloom with the potential for sub-lethal and lethal effects on invertebrates and fish;
- potential for depletion of oxygen concentrations in the water column and sediments as a result of the die-off of phytoplankton blooms with the potential for sub-lethal and lethal effects on invertebrates and fish;
- contribution to increased turbidity in the water column and reduction in light availability to macroalgae and other aquatic plants growing in the photic zone;
- reduction in oxygen availability in intertidal sediments under algal mats with the potential for sub-lethal and lethal effects on infaunal invertebrates and reduced feeding areas for fish and birds;
- potential for severe degradation of the ecosystem with adverse consequences for sea birds and Annex II sea mammals.

Appendix B
Initial Dilution Calculations for Buoyant Plumes

2 Pages

Calculation - worst case condition

The initial dilution of a buoyant jet has been most accurately predicted in still water using the Cedarwall equation (Cedarwall 1968) but it is more difficult to predict dilutions in moving waters. The inability to predict this effect accurately results in under-estimation of the dilution effect. A more reliable prediction model for dilution in moving water has been produced, as described by WRc, which uses theoretical dimensional analysis backed up by field data collected on initial dilutions above outfalls.

For a tidal receiving water, the worst case conditions will usually be in still water at low tide. Here the Cedarwall equation is the most appropriate.

The densimetric Froude number (F) is given by:

$$F = \frac{v_j}{\left(\frac{\rho_a - \rho_o}{\rho_a} gd\right)^{\frac{1}{2}}}$$

From the Cedarwall equation:

$$S = 0.54F\left(\frac{0.38H}{dF} + 0.66\right)^{\frac{5}{3}}$$

where:

v_j = jet velocity (m/s)

d = jet diameter (m)

ρ_a = ambient water density

ρ_o = effluent density

g = acceleration due to gravity (m/s^2)

H = water depth above outlet (m)

S = dilution ratio

Calculation for moving receiving water

The WRc analysis method suggests two regimes for buoyant discharges, the buoyancy dominated near field (BDNF) and the buoyancy dominated far field (BDFF). In the case of BDNF, the discharge is influenced primarily by the discharge buoyancy and occurs where there are weak ambient currents. BDFF occurs in conditions of strong ambient current where the initial dilution is influenced less by buoyancy and more so by ambient current. In each case, the appropriate regime was tested, allowing the most appropriate dilution calculation to be employed. The predictions require data on the density of the effluent, the density of seawater, effluent port flow, the mean current velocity of the receiving waters and the depth of the outfall port below surface water level.

The initial step is to calculate B (the effluent buoyancy flux) (m^4/s^3).

$$B = \left(\frac{\rho_a - \rho_o}{\rho_a}\right) g\, q_p$$

If:

$H < \frac{5B}{U_a^3}$ then a BDNF condition exists and initial dilution (S) is given by:

$$S = C_1 \frac{B^{1/3} H^{5/3}}{q_p}$$

where C_1 is a constant based on experimental data.

If:

$H > \frac{5B}{U_a^3}$ then a BDFF condition exists and initial dilution (S) is given by:

$$S = C_3 \frac{U_a H^2}{q_p}$$

where

q_p = effluent flow rate (m^3/s) g = acceleration due to gravity (m/s^2)

ρ_a = ambient water density H = water depth above outlet (m)

ρ_o = effluent density U_a = ambient current velocity (m/s)

and C_3 is a constant based on experimental data.

Values for the constants are given in the table below.

Values for constants C1 and C3 in columns H and I	C_1 (for BDNF)	C_3 (for BDFF)
95%ile exceedance - i.e. to predict dilution rate likely to be exceeded 95% of the time	0.16	0.11
Median minimum dilution values - i.e. to predict dilution rate likely to be exceeded 50% of the time	0.27	0.27
Mean minimum dilution values - i.e. to predict dilution rate likely to be exceeded 38-40% of the time	0.34	0.32

Appendix C
Maps of Biotopes

2 Pages

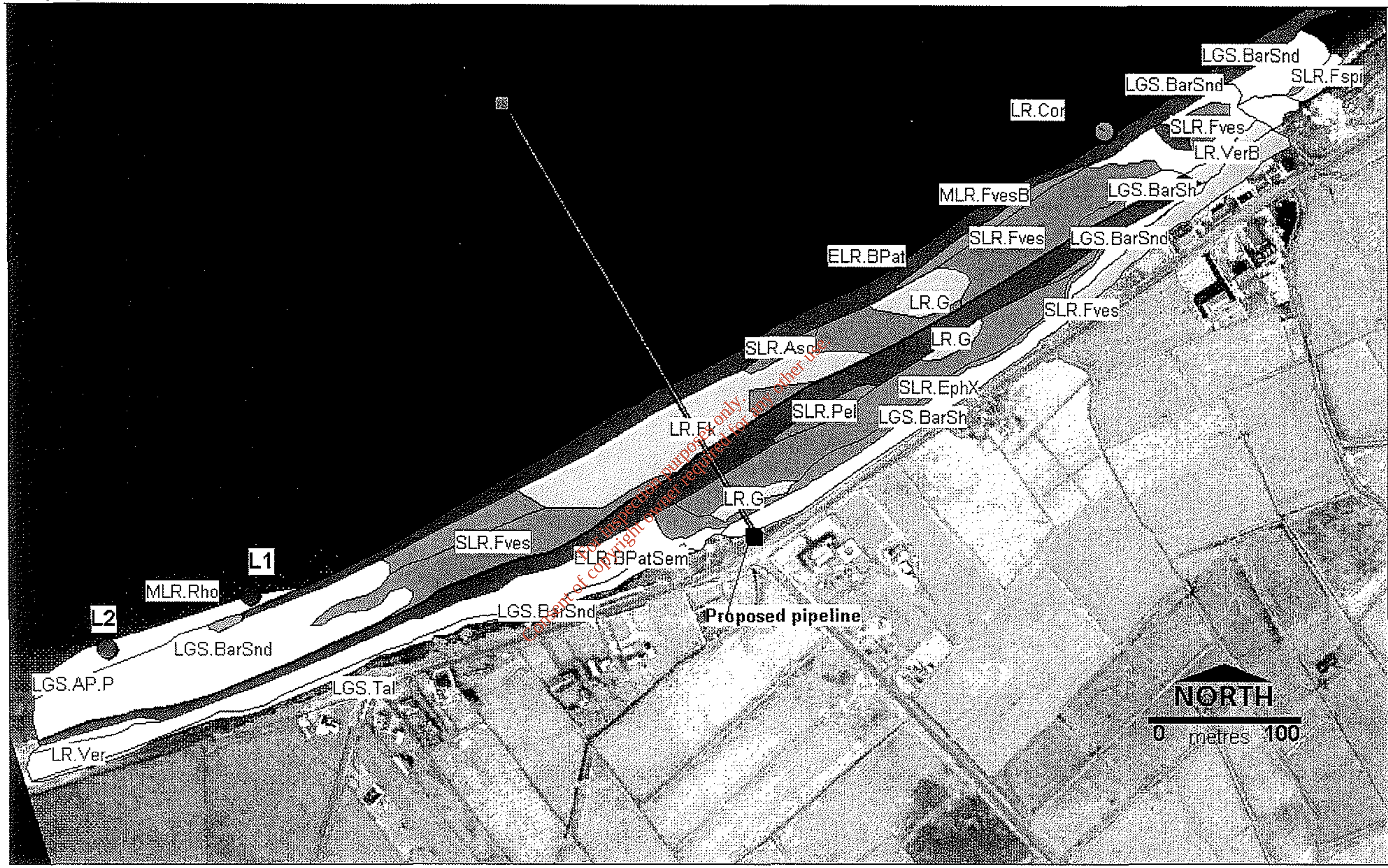

Figure 1. Biotopes recorded on littoral survey at Quilty. Sediment samples for infauna (L1 & L2 are also marked). Colours represent higher biotope types.

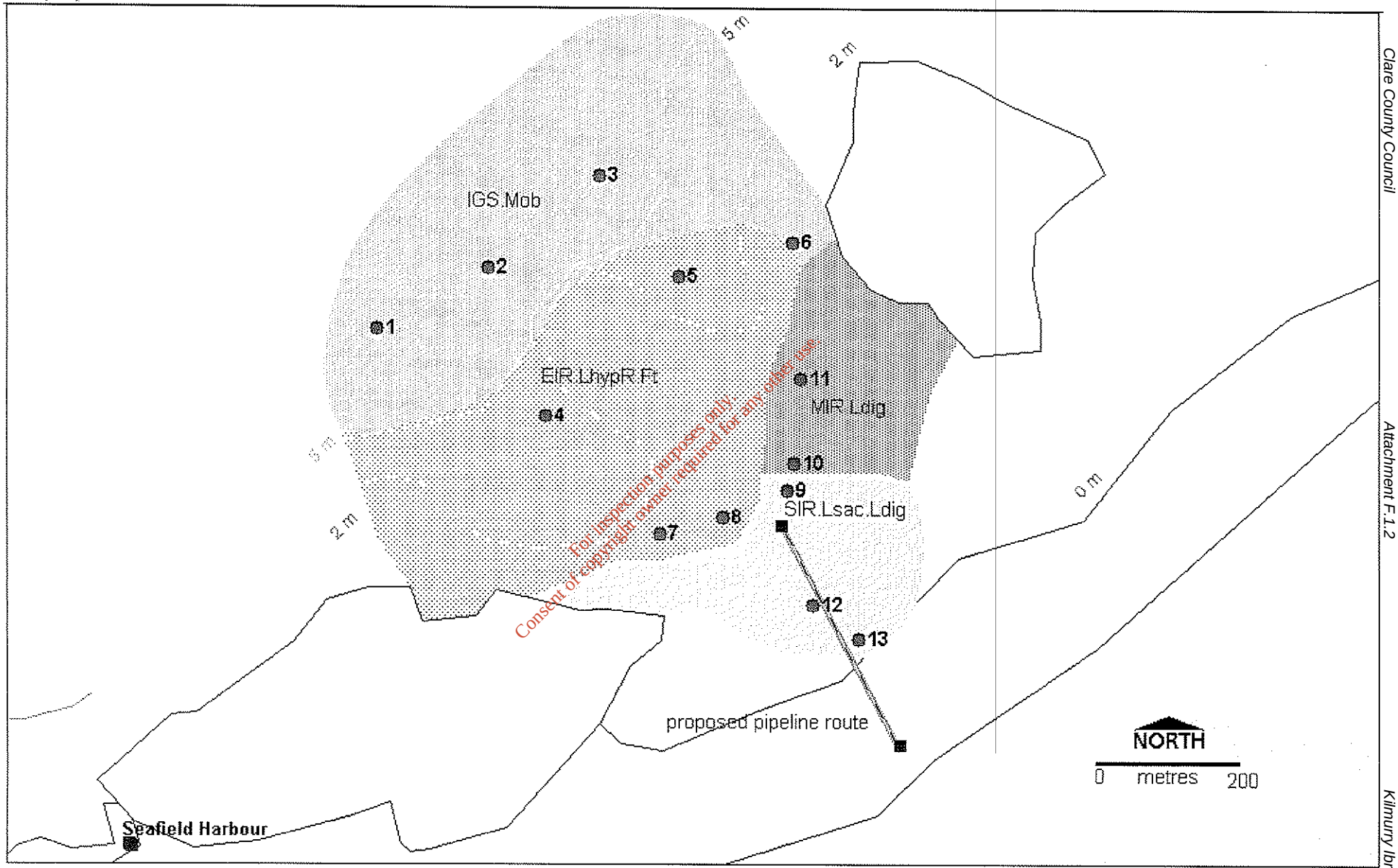

Figure 2. Sublittoral sample sites (1 - 13) and biotopes, colours show approximate extents of biotopes only, approximate location of proposed pipeline is shown in brown.

Appendix D
Description of biotopes

5 Pages

APPENDIX D – DESCRIPTION OF BIOTOPES

LR.Ver.B ***Verrucaria maura*** **and sparse barnacles on exposed littoral fringe rock**
Exposed rock in the littoral fringe with a sparse covering of barnacles over the black lichen *Verrucaria maura*. On south-west and western shores the barnacle is usually *Chthamalus montagui* which may extend over the whole of the zone. On north and east coast shores the barnacle is usually *Semibalanus balanoides*, and is usually restricted to the lower littoral fringe, with a band of *V. maura* only in the upper littoral fringe. Littorinid molluscs are usually present; *Pelvetia canaliculata* may be present, becoming increasingly more common with greater shelter (see PelB). Ver.B occurs on vertical faces of more sheltered shores with *Pelvetia* (PelB). Ver.B is usually found above *Mytilus edulis* and barnacles (MytB) or the Barnacle and *Patella* zone (BPat, BPat.Cht or BPat.Sem), both of which have much denser coverings of barnacles.

ELR.BPat.Sem ***Semibalanus balanoides*** **on exposed or moderately exposed, or vertical sheltered, eulittoral rock**
Exposed to moderately exposed eulittoral bedrock and boulders characterised by dense barnacles *Semibalanus balanoides* and the limpet *Patella vulgata*. In the north-west, where *Chthamalus* spp. also occur, *Semibalanus balanoides* may form a grey band below the distinct white band of *Chthamalus* spp. (BPat.Cht) in which patches of *Lichina pygmaea* may be prominent On some shores, particularly in the south, the *Lichina* may form a distinct zone (see BPat.Lic). On the east coast, where there is no *Chthamalus* spp. *Lichina*, if present, tends to form a band astride the upper limit of the barnacles (i.e. partly in BPat and partly in Ver.B). Cracks and crevices in the rock provide a refuge for small mussels *Mytilus edulis*, winkles *Littorina neglecta* and the dog whelk *Nucella lapillus*. Damp crevices are also frequently occupied by red algae, particularly *Osmundea pinnatifida*, *Mastocarpus stellatus* and encrusting coralline algae. With decreasing wave exposure *Fucus vesiculosus* is able to survive, gradually replacing the barnacles and *Patella* biotope (see FvesB). BPat.Sem may also occur on steep and vertical faces on sheltered shores, while fucoids dominate the flatter areas.

MLR.Fser ***Fucus serratus*** **on moderately exposed lower eulittoral rock**
Lower eulittoral bedrock and stable boulders with a canopy of the serrated wrack *Fucus serratus*. Several variants of this biotope are described. These are *Fucus serratus* with red seaweeds (Fser.R), dense *F. serratus* (Fser.Fser), *F. serratus* with under-boulder communities (Fser.Fser.Bo) and *F. serratus* and piddocks on soft rock (Fser.Pid). Dense *Fucus serratus* also occurs on more sheltered shores (Fserr).

MLR.Rho ***Rhodothamniella floridula*** **on sand-scoured lower eulittoral rock**
Lower eulittoral and sublittoral fringe sand-scoured bedrock and boulders are often characterised by canopy algae (usually *Fucus serratus*), beneath which a mat of the sand-binding red alga *Rhodothamniella floridula* occurs. These mats can also form distinct areas without *F. serratus*. The small hummocks of *R. floridula* also contain other small red and brown algae and species of worm and amphipod may burrow into the *Rhodothamniella* mat. Other sand-tolerant algae, such as *Polyides rotundus*, *Furcellaria lumbricalis*, *Gracilaria verrucosa* and *Cladostephus spongiosus*, may be present. Ephemeral algae such as *Enteromorpha* spp., *Ulva* spp. and *Porphyra* spp. may occur. Where sand scour is more severe, fucoids and *Rhodothamniella* may be rare or absent and these ephemeral algae dominate the substratum (EntPor).

SLR.Fspi ***Fucus spiralis*** **on moderately exposed to very sheltered upper eulittoral rock**
Moderately exposed to very sheltered upper eulittoral bedrock and boulders are typically characterised by a band of the spiral wrack *Fucus spiralis* overlying the black lichens *Verrucaria*

maura and *V. mucosa*. Limpets *Patella vulgata*, winkles *Littorina* spp. and barnacles *Semibalanus balanoides* are usually present under the fucoid fronds and on open rock. During the summer months ephemeral green algae such as *Enteromorpha* spp. and *Ulva lactuca* may also be present. This zone usually lies below a *Pelvetia canaliculata* zone (Pel or PelB); occasional clumps of *Pelvetia* may be present (usually less than common) amongst the *F. spiralis*. In areas of extreme shelter, such as in Scottish sealochs, the *Pelvetia* and *F. spiralis* zones often merge together forming a very narrow band. Fspi occurs above the *Ascophyllum nodosum* (Asc) and/or *Fucus vesiculosus* (Fves) zones and these two fucoids may also occur, although *Fucus spiralis* always dominates. Vertical surfaces in this zone, especially on moderately exposed shores, often lack the fucoids and are characterised by a barnacle-*Patella* community (BPat.Sem).

SLR.Fves *Fucus vesiculosus* on sheltered mid eulittoral rock

Moderately exposed to sheltered mid eulittoral rock characterised by a dense canopy of large *Fucus vesiculosus* plants (typically abundant to superabundant). Beneath the algal canopy the rock surface has a sparse covering of barnacles (typically rare-frequent) and limpets, with mussels confined to pits and crevices. *Littorina littorea* and *Nucella lapillus* are also found beneath the algae, whilst *Littorina obtusata* and *Littorina mariae* graze on the fucoid fronds. The fronds may be epiphytised by the filamentous brown alga *Elachista fucicola* and the small calcareous tubeworm *Spirorbis spirorbis*. In areas of localised shelter, *Ascophyllum nodosum* may also occur, though never at high abundance (typically rare to occasional) - (compare with Asc). Damp cracks and crevices often contain patches of the red seaweeds *Osmundea* (*Laurencia*) *pinnatifida*, *Mastocarpus stellatus* and encrusting coralline algae. This biotope usually occurs between the *Fucus spiralis* (Fspi) and the *Fucus serratus* (Fser) zones; both of these fucoids may be present in this biotope, though never at high abundance (typically less than frequent). In some sheltered areas *Fucus vesiculosus* forms a narrow zone above the *A. nodosum* zone (Asc). Where freshwater runoff occurs on more gradually sloping shores *F. vesiculosus* may be replaced by *Fucus ceranoides* (Fcer).

SLR.Asc *Ascophyllum nodosum* on very sheltered mid eulittoral rock

Sheltered to very sheltered mid eulittoral rock with the knotted wrack *Ascophyllum nodosum*. Several variants of this biotope are described. These are: full salinity (Asc.Asc), tide-swept (Asc.T) and variable salinity (Asc.VS).

LR.G Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in upper shore rockpools

Rockpools in the supralittoral, littoral fringe or upper eulittoral which are subject to variable salinity and widely fluctuating temperatures are characterised by the ephemeral green alga *Enteromorpha* spp. or the filamentous green alga *Cladophora* spp. Due to the physical stress imposed on these upper shore pools, grazing molluscs are generally in lower abundance than eulittoral pools, allowing the green algae to proliferate under reduced grazing pressures. The rock surface is often covered by the black lichen *Verrucaria maura*. On more exposed shores crevices in the rock may contain small *Mytilus edulis*. The bright orange copepod *Tigriopus fulvus* is tolerant of large salinity fluctuations and may also occur in large numbers in these upper shore pools.

LR.Cor *Corallina officinalis* and coralline crusts in shallow eulittoral rockpools

Shallow rockpools throughout the eulittoral zone may be characterised by a covering of encrusting coralline algae on which *Corallina officinalis* often forms a dense turf. These 'coralline' pools have a striking appearance as they are dominated predominantly by red algae. Filamentous and foliose red algae found in these pools include *Dumontia contorta*, *Mastocarpus stellatus* and *Ceramium rubrum*. The green algae *Cladophora rupestris* and *Enteromorpha* spp. can also occur. The pools

may hold large numbers of grazing molluscs, particularly *Littorina littorea* (which often occurs in exceptionally high densities in upper shore pools), *Patella vulgata* and *Gibbula cineraria.* Gastropods may graze these pools to such an extent that they are devoid of any foliose red algae, and are reduced to encrusting coralline algae and large numbers of gastropods. Large brown algae are generally absent (compare with FK), although small *Halidrys siliquosa* may be present. Within the pools, pits and crevices are often occupied by the anemone *Actinia equina* and small *Mytilus edulis*. Similar sized pools in the littoral fringe generally lack the encrusting coralline algae and are characterised by green algae (see G). In Ireland, the sea urchin *Paracentrotus lividus* can dominate these shallow coralline pools (see Cor.Par). In south-west Britain, the brown alga *Bifurcaria bifurcata* (Cor.Bif) or *Cystoseira* spp. (Cor.Cys) can be regionally dominant.

LR.Cor.Bif *Bifurcaria bifurcata* in shallow eulittoral rockpools

Eulittoral rockpools in south-west Britain dominated by the brown alga *Bifurcaria bifurcata.* Shallow coralline pools typically dominated by red algae (see Cor) can support dense growths of *B. bifurcata* with little else other than *Corallina officinalis,* encrusting coralline algae and some grazing gastropods and anemones. [*B. bifurcata* is at the edge of its range in Britain; in France it occurs in deeper lower shore pools where the alga forms a noticeable band in the mid pool level, below a band of *Corallina officinalis* and coralline crusts]. *Cystoseira* spp., another warm-water brown algae found in south-west Britain, often occurs in equal abundance in the shallow pools. *B. bifurcata* also occurs in deeper pools (see LR.FK) with the brown algae *Halidrys siliquosa* and *Himanthalia elongata,* below which *Laminaria digitata* may occur.

LR.Cor.Cys *Cystoseira* spp. in shallow eulittoral rockpools

Shallow eulittoral rockpools on exposed to moderately exposed south-western shores can be dominated by the brown alga *Cystoseira* spp. and coralline algae. These pools generally contain some sand and pebbles on the base and support dense red algal growth comprising: *Ceramium* spp., *Calliblepharis jubata, Chondrus crispus* and *Gelidium latifolium.*

LR.FK Fucoids and kelps in deep eulittoral rockpools

Deep rockpools in the mid to lower eulittoral zone often contain a community characterised by *Fucus serratus* and *Laminaria digitata.* Other large brown algae, including *Laminaria saccharina, Himanthalia elongata* and *Halidrys siliquosa,* may also occur. The rock surface is usually covered by encrusting coralline algae. A wide variety of filamentous and foliose algae, which are typical of lower shore and shallow sublittoral zones (e.g. *Palmaria palmata, Chondrus crispus, Ceramium* spp., *Membranoptera alata* and *Gastroclonium ovatum*) occur beneath the brown algal canopy. Algal-free vertical and overhanging faces often support the sponge *Halichondria panicea* and anemones *Actinia equina.* The abundance of grazing molluscs varies considerably. In some, large numbers of littorinids and limpets are probably responsible for the limited variety of red seaweeds present. In other pools, fewer grazers may result in an abundance of these algae. Where boulders occur in these pools they provide a greater variety of micro-habitats which support a variety of fauna. Mobile crustaceans (*Pagurus bernhardus* and *Carcinus maenas*), brittlestars (*Ophiothrix fragilis* and *Amphipholis squamata*), encrusting bryozoans and ascidians are typically found beneath and between boulders.

LGS.BarSh Barren gravel and shingle shores

Shingle or gravel shores, typically with sediment particle size from 4-256 mm, are normally only found on exposed open coasts in fully marine conditions. Such shores tend to have little associated finer sediment and due to their high degree of mobility support virtually no macrofauna. Larger 'sediment' is considered to be boulders and is addressed in the mixed shores section of the classification. Coarse sand, the next grade of sediment smaller than this size range is also found on exposed open coasts and has no distinct macrofaunal community as described in LGS.BarSnd.

The shingle shore and mobile littoral sand biotopes are therefore distinguished solely on the basis of their substratum (i.e. particle size). Macrofauna are absent or extremely sparse in this very mobile and freely draining substratum. Trial excavations are unlikely to reveal macroscopic infauna. However, the few species that may be found are those washed into the habitat by the ebbing tide, including the occasional amphipod or small polychaete. There may be a temporary cover of the green algae *Enteromorpha* or *Ulva* during periods of stability in the summer.

LGS.Tal Talitrid amphipods in decomposing seaweed on the strand-line
A community of talitrid amphipods may occur on any shore where decomposing seaweed accumulates on the extreme upper shore strand-line. The community occurs on a wide variety of sediment shores composed of shingle and mixed substrata through to fine sands, but may also occur on mixed and rocky shores in some circumstances. The decaying seaweed provides cover and humidity for *Talitrus saltator* and other components of the community. The amphipods *Orchestia* spp. are also often present, as well as enchytraeid oligochaetes. Polychaetes, molluscs and other crustaceans may be brought in on the tide, but are not necessarily associated with the infaunal community. Further analysis of the data may determine that *Orchestia* spp. are associated with a denser strand and that there are differences in the community dependant upon the substratum-type. *Talitrus saltator* may occur further down the shore, almost invariably accompanied by burrowing amphipods such as *Bathyporeia* spp. (LGS.AEur).

LGS.BarSnd Barren coarse sand shores
Freely-draining coarse sandy beaches, particularly on the upper shore, which lack a macrofaunal community due to their continual mobility. Trial excavations are unlikely to reveal any macrofauna in these typically steep beaches on exposed coasts. Burrowing amphipods *Bathyporeia* spp. or *Pontocrates* spp. and the isopod *Eurydice pulchra* may be found in extremely low abundances, but if present in any quantity should be classed as LGS.AEur. Other species that may be found in low abundance may be left behind by the ebbing tide.

EIR.LhypR.Ft *Laminaria hyperborea* forest with dense foliose red seaweeds on exposed upper infralittoral rock
Very exposed and exposed upper infralittoral bedrock or large boulders characterised by a dense forest of the kelp *Laminaria hyperborea*, beneath which is a dense turf of foliose red seaweeds. The dense seaweed turf is due, in part, to the relatively low urchin-grazing pressure in such shallow exposed conditions. The shallowest kelp plants are often short or stunted, while deeper plants are taller with heavily epiphytised stipes. Amongst the red seaweeds, an often dense turf of the bryozoans *Scrupocellaria* spp. and *Securiflustra securifrons* may occur. The cushion fauna in this biotope is markedly less abundant than kelp forests in areas of greater wave surge (EIR.LhypFa) and whilst sponges, anemones and polyclinid ascidians may be present, they do not occur at high abundance. Beneath the under-storey the rock surface is generally covered with encrusting coralline algae. This kelp forest most commonly occurs beneath a zone of *Alaria/Mytilus* (EIR.Ala.Myt) and above a *L. hyperborea* park (EIR.LhypR.Pk) or a park of *L. saccharina* and/ or *Saccorhiza polyschides* (EIR.LsacSac).

MIR.Ldig *Laminaria digitata* on moderately exposed or tide-swept sublittoral fringe rock
Exposed to sheltered sublittoral fringe rock with a canopy of the kelp *Laminaria digitata*. Several variants of this biotope are described for moderately exposed, sheltered, tide-swept and boulder shores.

IGS.Mob Sparse fauna in infralittoral mobile clean sand
Coarse sandy sediment in shallow water, often duned, on exposed or tide-swept coasts often contains very little infauna due to the mobility of the substratum. Some opportunistic populations

of infaunal amphipods may occur, particularly in less mobile examples. Sand eels *Ammodytes* sp. may occasionally be observed in association with this biotope (and others). This biotope is more mobile than IGS.NcirBat and may be closely related to LGS.BarSnd on the shore. Common epifaunal species such as *Pagurus bernhardus*, *Liocarcinus depurator*, *Carcinus maenas* and *Asterias rubens* may be encountered and are the most conspicuous species present. A similar biotope, IGS.MobRS, occurs in reduced salinities but differs in that the sparse fauna of IGS.Mob are not tolerant of reduced salinities.

SIR.Lsac.Ldig ***Laminaria saccharina* and *Laminaria digitata* on sheltered sublittoral fringe rock**

Sheltered bedrock and boulders in the sublittoral fringe may be characterised by a mixed canopy of the kelps *Laminaria digitata* (usually in its broad-fronded cape form) and *Laminaria saccharina* (both species generally frequent or greater). Beneath the canopy a wide variety of red seaweeds, including *Palmaria palmata*, *Corallina officinalis*, *Mastocarpus stellatus*, *Chondrus crispus* and *Plocamium cartilagineum*, may be present. The surface of the rock is usually covered with encrusting coralline algae; there may be patches of the sponge *Halichondria panicea* frequently occurs in cracks in the rock. Beneath and between boulders a variety of mobile crustaceans (*Carcinus maenas*, *Cancer pagurus* and *Porcellana platycheles*), spirorbid worms, starfish (*Asterias rubens*) and encrusting bryozoans are common. On such sheltered shores the transition between sublittoral fringe and the true sublittoral zone may not be distinct; this biotope therefore extends into the shallow sublittoral.

Appendix E
IWDG Cetacean Records

2 Pages

Table 1. Cetacean sighting records from Doonbeg to Liscannor Bay (1991-2004)

Date	Species	Numbers
23 Oct 2004	common dolphin	8
29 Mar 2003	small whale (not porpoise)	20
19 Mar 2003	small whale (not porpoise)	20
7 Aug 2000	common dolphin	20
30 Jun 1998	bottlenose dolphin	15
20 Aug 1995	bottlenose dolphin	6
9 Aug 1995	bottlenose dolphin	6
6 Aug 1995	bottlenose dolphin	6
4 Aug 1995	bottlenose dolphin	6
23 Jul 1995	bottlenose dolphin	6
20 Jul 1995	bottlenose dolphin	6
20 Jul 1995	bottlenose dolphin	6
8 Jul 1995	bottlenose dolphin	6
7 Jul 1995	bottlenose dolphin	6
6 Jul 1995	bottlenose dolphin	6
5 Jul 1995	bottlenose dolphin	6
4 Jul 1995	bottlenose dolphin	6
20 Jun 1995	bottlenose dolphin	6
13 Jun 1995	bottlenose dolphin	6
5 May 1995	bottlenose dolphin	6
2 May 1995	bottlenose dolphin	6
1 May 1995	bottlenose dolphin	6
11 Aug 1994	bottlenose dolphin	6
8 Aug 1994	bottlenose dolphin	6
6 Aug 1994	bottlenose dolphin	6
6 Jul 1994	bottlenose dolphin	6
29 May 1994	bottlenose dolphin	4

Source: IWDG database

Table 2. Cetacean stranding records from Doonbeg to Rineen **(1950-2004)**

Date	Species and location	Sex	Size
2 Oct 2004	Pilot Whale Lough Donnell, Co. Clare	?	?
5 May 2004	Sperm Whale Quilty, Co. Clare	Male	5.8 m
2 May 2004	Risso's Dolphin Doonbeg, Co. Clare	?	?
3 Feb 2003	Common Dolphin Doonbeg, Co Clare	Male	2.12m
3 Feb 2003	Common Dolphin Doonbeg, Co Clare	Male	2.12m
10 Nov 2002	Common Dolphin Seafield Beach, Quilty, Co. Clare	Female	1.93m
29 Jul 2002	Common Dolphin Lough Donnell, Co. Clare	?	1.7m
11 Jul 2002	Bottlenose Dolphin, Doonbeg, Co. Clare	Female	2.78m
11 May 2002	Common Dolphin Doonbeg, Co. Clare	Male	1.58m
11 May 2002	Common Dolphin Doonbeg, Co. Clare	Female	1.90m
28 Aug 2001	Bottlenose Dolphin, Doonbeg, Co. Clare	Female	3.2m
15 Jul 2001	Common Dolphin Doonbeg, Co. Clare	?	?
8 May 2001	Cuvier's Beaked Whale Doonbeg, Co. Clare	?	?
1 May 2001	Harbour Porpoise* Doonbeg, Co. Clare	Male	1.19m
5 Mar 2001	Common Dolphin Doonbeg, Co. Clare	Male	1.30m
3 Dec 2000	Harbour Porpoise* Quilty, Co.Clare. (R020 755)	Female	1.33m
21 Nov 2000	Common Dolphin Doonbeg, Co. Clare	Male	1.82m
21 Nov 2000	Common Dolphin Doonbeg, Co. Clare	Male	2.07m
21 Nov 2000	Pilot Whale Doonbeg, Co. Clare	?	3.8m
27 Mar 2000	Cuvier's Beaked Whale Doonbeg, Co. Clare	Male	c5.0m
18 Oct 1999	Pilot Whale* Bartra, Co. Clare (R0986)	Male	3.92m
23 Mar 1998	Harbour Porpoise* Doonbeg, Co. Clare	?	?
8 Apr 1991	Bottle-nosed Dolphin* Lough Donnell, Co. Clare (R71)	?	2.62m
16 Mar 1989	Cuvier's Beaked Whale* Lurgha Pt., Co. Clare (Q9974)	Female	6.50m
25 Feb 1989	Pilot Whale* Quilty, Co. Clare (Q0276)	Male	5.70m
19 Mar 1988	Sperm Whale* Miltown Malbay, Co. Clare (R0381)	Male	12.65m
19 Feb 1977	Pilot Whale* Quilty, Co. Clare	Male	c6.00m
26 Nov 1972	Pilot Whale* Mutton Isl., Co. Clare (Q9874)	?	?
31 Mar 1967	Cuvier's Beaked Whale Miltown Malbay, Co. Clare	Male	?

Source: IWDG database

SITE SYNOPSIS

SITE NAME: CARROWMORE POINT TO SPANISH POINT AND ISLANDS

SITE CODE: 001021

This site extends along the Clare coastline from Spanish Point (3 km west of Milltown Malbay), in a south-south- westerly direction to Carrowmore Point. It comprises a strip of coastline, several offshore islands and rocks (notably Mutton Island), and the open marine water of Mal Bay between the islands and the mainland. Lough Donnell is a lagoon found near Carrowmore Point at the southern end of the site. Underlying the site are Carboniferous grits which are bedded at a low angle and which give rise to surf conditions in places along the coast. The headlands experience some of the most severe conditions of exposure in Ireland.

The site is a candidate SAC selected for lagoon and petrifying springs, both priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for other habitats listed on Annex I of the directive – perennial vegetation of stony banks and reefs.

A further range of marine and coastal habitats are represented on the site, including mud/sandflats, sand dunes, sandy, shingle and boulder beaches, clay and rocky sea cliffs, bedrock shores, the associated wetland communities of the lagoon and a short section of the Annageeragh River.

The priority habitat of petrifying springs with tufa formations is well represented at the site and occurs along the sea cliffs at the south end of Spanish Point beach. Species typical of tufa formations found at the site include *Palustriella commutata, Cratoneuron filicinum, Eucladium verticillatum, Leiocolea turbinata* and *Pellia endiviifolia.*

The intertidal reefs have both good zonation of communities down the shore and excellent examples of communities which occur in areas very exposed to moderately exposed to wave action. Spanish Point holds a very high number of littoral reef communities (13 different community types). The low shore and subtidal fringe at both Spanish Point and Cloghaunicy Point have high species richness that ranged from 71 to 85 species. Subtidally, the area is important for its deep, exposed reef communities that are characterized erect sponges and the fragile sea fan *Eunicella verrucosa.* There are a number of rare species present including the sponge *Tetilla zetlandica* which has only known from 4 localities in Ireland between Galway Bay and the Kerry Head Shoal. Algal communities are well developed, with an excellent diversity of red and brown algae species.

Small sand dune systems are found near Spanish Point, about Lurga Point and further south. The northern dune system is somewhat degraded, while that near Lurga Point is less damaged and more stable, and includes areas of foredune and fixed dune.

Shingle banks are found at the base of cliffs and at the head of bays. Due to their exposure these support a sparse vegetation with species such as Sea Beet (*Beta vulgaris* subsp. *maritima*), Orache (*Atriplex* spp.), Sea Mayweed (*Matricaria maritima*) Silverweed (*Potentilla anserina*) and Sea-milkwort (*Glaux maritima*). This is an important habitat that is listed on Annex I of the EU Habitats Directive.

Lough Donnell is a shallow (generally <1 m), sedimentary lagoon. It has an impressive cobble barrier approximately 7 m high and 40 m wide, modified by installation of a large concrete tunnel which forms a permanent inlet/outlet. Seawater enters through this tunnel, perhaps on most tides and also by percolation through the barrier. A small river, the Annageeragh River enters the lagoon from the east. Salinity is assumed to be oligohaline as relatively large volumes of fresh water entering the lagoon appear to prevent appreciable amounts of seawater entering on most tides. Geomorphologically, Lough Donnell is a classic lagoon with one of the most impressive barriers in the country. Floristically, the most notable feature of the lagoon is the presence of the lagoonal specialist Beaked Taselweed (*Ruppia maritima).* Marginal vegetation, which is best developed on the eastern and southern shores, consists mostly of Common Reeds (*Phragmites australis),* Bulrush *(Schoenoplectus tabernaemontani)* and Sea Club-rush (*Scirpus maritimus).* The faunal assemblage reflects the predominance of freshwater over marine influence throughout the lagoon. A total of 32 aquatic faunal taxa were recorded of which 5 species are regarded as lagoonal specialists (*Palaemonetes varians, Sigara stagnalis, Jaera nordmanni, Neomysis integer, Notonecta viridis*). *Notonecta viridis* is a rare brackish water species in Ireland. A Red Data Book plant species, Corky-fruited Water-dropwort (*Oenanthe pimpinelloides*), occurs along the Annageeragh River.

The stretch of coastline between Quilty and Lurga Point has extensive areas of mud/sand flats and supports nationally important bird populations. The following counts are average maxima over five winters 1994/95-1998/99: wintering Purple Sandpiper (239i), Dunlin (1540i), Turnstone (476i), Ringed Plover (170i) and Sanderling (189i). Other species which occur in winter include Grey Plover, Oystercatcher, Lapwing, Curlew, Redshank and Golden Plover.

The offshore islands, Mutton Island and Mattle Island, and rocks, Carrickaneelwar and Seal Rock are important for the seabirds that breed on them, i.e. Storm Petrel (Mutton Island and Mattle Island, the only colonies in Clare, though recent studies are uncertain), Cormorant (Mattle Island, 60p in 1990), Shag (Mattle Island and Mutton Island, c. 30p in 1990), Great Black-backed Gull, Lesser Black-backed Gull and Herring Gull. Mutton Island also holds an internationally important wintering flock of Barnacle Geese (c. 350 individuals in 1994, with up to 480 recorded previously). This species is also occasionally seen on Mattle Island and on adjacent parts of the mainland. A variety of 'terrestrial' birds, e.g. Skylark, Meadow Pipit, Rock Pipit, Pied Wagtail, Raven, Swallow, Wheatear, Stonechat, amongst others, also use the islands (mainly Mutton Island) and are presumed to breed there.

Lough Donnell is used by a variety of birds, mainly waders (numbers in parentheses are based on a single count in one season between 1984/85 and 1986/87): Wigeon (16), Golden Plover (65), Grey Plover (12), Lapwing (170), Dunlin (65), Curlew (230) and Shag (52). Sand Martin nest in low clay cliffs to the north of the lake. Mutton

Island and Mattle Island are designated Special Protection Areas for their birds; the former is also a Wildfowl Sanctuary. Barnacle Goose, Storm Petrel and Golden Plover are listed on Annex I of the E.U. Birds Directive.

Grey Seal are regular in the area and haul out on all of the islands. Mutton Island has a high density of Irish hares.

The coastline around Spanish Point is an amenity and tourist resort and the sand dune system here has become degraded by overuse. Other areas of sand dune on the site have been damaged by overgrazing and erosion.

The site contains a diversity of habitats, plant and animal communities and species and is notable for the occurrence of several habitats listed on Annex I of the E.U. Habitats Directive, namely reefs, lagoons and perennial vegetation of stony banks. The presence of a lagoon, a habitat accorded priority status on this annex, is of particular significance. The range of birds that use the site and the large populations of several of these that are found add considerably to the importance of the site. Additionally, the site has been highly rated for the diversity of marine plant and animal species it supports.

17.1.2003

Conservation Objectives for Carrowmore Point to Spanish Point and Islands SAC [001021]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [1150] * Coastal lagoons
- [1170] Reefs
- [1220] Perennial vegetation of stony banks
- [7220] * Petrifying springs with tufa formation (*Cratoneurion*)

Site code: IE0001021 NATURA 2000 Data Form

NATURA 2000

STANDARD DATA FORM

FOR SPECIAL PROTECTION AREAS (SPA)

FOR SITES ELIGIBLE FOR IDENTIFICATION AS SITES OF COMMUNITY IMPORTANCE (SCI)

AND

FOR SPECIAL AREAS OF CONSERVATION (SAC)

Site code: IE0001021 NATURA 2000 Data Form

1. SITE IDENTIFICATION

1.1. TYPE	*1.2. SITE CODE*	*1.3. COMPILATION DATE*	*1.4. UPDATE*
I	IE0001021	200108	

1.5. RELATION WITH OTHER NATURA 2000 SITES:

NATURA 2000 SITE CODES

IE0000053
IE0000059

1.6. RESPONDENT(S):

National Parks & Wildlife Service of the Department of the Environment, Heritage and Local Government. 7 Ely Place, Dublin 2, Ireland.

1.7. SITE NAME:

Carrowmore Point to Spanish Point and Islands

1.8. SITE INDICATION AND DESIGNATION/CLASSIFICATION DATES:

DATE SITE PROPOSED AS ELIGIBLE AS SCI: ***DATE CONFIRMED AS SCI:***

200201

DATE SITE CLASSIFIED AS SPA: ***DATE SITE DESIGNATED AS SAC:***

Site code: IE0001021 NATURA 2000 Data Form

2. SITE LOCATION

2.1. SITE CENTRE LOCATION

LONGITUDE	LATITUDE
W 9 30 32	52 48 45

W/E (Greenwich)

2.2. AREA (HA):

4238.29

2.3. SITE LENGTH (KM):

2.4. ALTITUDE (M):

MINIMUM	MAXIMUM	MEAN
-49	34	-20

2.5. ADMINISTRATIVE REGION:

NUTS CODE	REGION NAME	% COVER
IE023	Mid-West	16
Marine area not covered by a NUTS-region		8

2.6. BIOGEOGRAPHIC REGION:

Alpine	Atlantic	Boreal	Continental	Macaronesian	Mediterranean
☐	☑	☐	☐	☐	☐

Site code: IE0001021 NATURA 2000 Data Form

3. ECOLOGICAL INFORMATION

3.1. HABITAT types present on the site and assessment for them:

ANNEX I HABITAT TYPES:

CODE	%COVER	REPRESENTATIVITY	RELATIVE SURFACE	CONSERVATION STATUS	GLOBAL ASSESSMENT
1170	70	**A**	**C**	**A**	**A**
7220	1	**B**	**C**	**B**	**B**
1220	1	**B**	**C**	**C**	**B**
1150	1	**B**	**C**	**B**	**B**

3.2. SPECIES

covered by Article 4 of Directive 79/409/EEC

and

listed in Annex II of Directive 92/43/EEC

and

site assessment for them

Site code: IE0001021 NATURA 2000 Data Form

3.2.a. BIRDS listed on Annex I of Council directive 79/409/EEC

CODE	NAME	POPULATION				SITE ASSESSMENT			
		Resident	Migratory			Population	Conservation	Isolation	
			Breed	Winter	Stage				
A014	Hydrobates pelagicus		1-10 p			C		C	C	
A038	Cygnus cygnus			10-30 i		C		B	C	
A045	Branta leucopsis			350 i		B		A	C	A
A140	Pluvialis apricaria			883 i		C		B	C	

3.2.b. Regularly occuring Migratory Birds not listed on Annex I of Council directive 79/409/EEC

CODE	NAME	POPULATION				SITE ASSESSMENT			
		Resident	Migratory			Population	Conservation	Isolation	
			Breed	Winter	Stage				
A017	Phalacrocorax carbo		60 p			C		B	C	
A183	Larus fuscus		24 p			C		B	C	
A130	Haematopus ostralegus			128 i		C		B	C	
A137	Charadrius hiaticula			170 i		C		A	C	
A141	Pluvialis squatarola			14 i		C		B	C	
A142	Vanellus vanellus			352 i		C		B	C	
A144	Calidris alba			189 i		B		A	C	A
A148	Calidris maritima			239 i		A		A	C	A
A149	Calidris alpina			1540 i		C		A	C	
A160	Numenius arquata			179 i		C		B	C	
A162	Tringa totanus			43 i		C		B	C	
A169	Arenaria interpres			476 i		B		A	C	A

3.2.c. MAMMALS listed on Annex II of Council directive 92/43/EEC

3.2.d. AMPHIBIANS and REPTILES listed on Annex II of Council directive 92/43/EEC

3.2.e. FISHES listed on Annex II of Council directive 92/43/EEC

3.2.f. INVERTEBRATES listed on Annex II of Council directive 92/43/EEC

3.2.g. PLANTS listed on Annex II of Council directive 92/43/EEC

Site code: IE0001021 NATURA 2000 Data Form

3.3. Other Important Species of Flora and Fauna

GROUP							SCIENTIFIC NAME	POPULATION	MOTIVATION				
B	M	A	R	F	I	P							
					I		Thymosia guernei	c					**D**
					I		Tetilla zetlandica	r					**D**
					I		Axinella damicornis	c					**D**
					I		Axinella dissimilis	c					**D**
					I		Phakellia ventilabrum	c					**D**
					I		Alcyonium glomeratum	c					**D**
					I		Eunicella verrucosa	c					**D**
					I		Parazoanthus axinellae	r					**D**
					I		Isozoanthus sulcatus	c					**D**
					I		Tritonia nilsodhneri	c					**D**
					I		Paracentrotus lividus	c					**D**
					I		Palaemonetes varians	p					**D**
					I		Sigara stagnalis	p					**D**
					I		Jaera nordmanni	p					**D**
					I		Neomysis integer	p					**D**
					I		Notonecta viridis	p					**D**
					I		Bembidion bipunctatum	p					**D**
					I		Cypha punctum	p					**D**
						P	Ruppia maritima	p					**D**
						P	Oenanthe pimpinelloides	p		**A**			
		A					Rana temporaria	p		**A**			
		A					Rana temporaria	p				**C**	
	M						Lepus timidus hibernicus	p		**A**			
	M						Lepus timidus hibernicus	p			**B**		
	M						Lepus timidus hibernicus	p				**C**	
B							Phalacrocorax aristotelis	30 p				**C**	
B							Larus argentatus	20+ p					**D**
B							Larus marinus	20+ p					**D**
B							Cepphus grylle	14+ i				**C**	
B							Corvus corax	1 p					**D**

(B = Birds, M = Mammals, A = Amphibians, R = Reptiles, F = Fish, I = Invertebrates, P = Plants)

Site code: IE0001021 NATURA 2000 Data Form

4. SITE DESCRIPTION

4.1. GENERAL SITE CHARACTER:

Habitat classes	% cover
Marine areas, Sea inlets	83
Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	3
Coastal sand dunes, Sand beaches, Machair	1
Shingle, Sea cliffs, Islets	7
Inland water bodies (Standing water, Running water)	1
Bogs, Marshes, Water fringed vegetation, Fens	1
Heath, Scrub, Maquis and Garrigue, Phygrana	1
Dry grassland, Steppes	2
Humid grassland, Mesophile grassland	1
Total habitat cover	**100 %**

Other site characteristics

This site stretches for over 10 km of the west Clare coast. It consists mostly of marine waters which are exposed to the full force of Atlantic swells from the west. Tidal streams are weak to moderate. Bedrock is composed of Carboniferous Lower Devonian Shales and Sandstones, Carboniferous Slate Series and Calciferous Sandstone Series. Several islands are included, the largest of which is Mutton Island. Mutton Island is uninhabited and is dominated by a maritime grassy sward. The mainland shoreline is mostly rocky or stony, though there are several sandy beaches and areas of intertidal flats. Lough Donnell is a shallow, sedimentary lagoon with a large cobble barrier.

4.2. QUALITY AND IMPORTANCE:

The site holds a very high number of littoral reef communities. Some have extremely high species richness, e.g. 85 species in the sublittoral fringe and 80 species in the lower eulittoral south of Cloghaunichy Point. There are uncommon species in the intertidal (Paracentrotus lividus and Bifurcaria bifurcata). Sublittorally, the area is important for its deep, exposed reef communities that are characterized by unusual and delicate, erect sponges, the fragile anthozoan Eunicella verrucosa, the rare sponge Tetilla zetlandica and the anthozoan Parazoanthus axinellae. Lough Donnell is a good example of a moderately large, oligohaline percolation lagoon. The floral and faunal communities are not particularly rich but include an important brackish element with five lagoonal specialists and it is the most northerly station of one relatively rare species (Notonecta viridis). The site has significant examples of vegetated shingle and stony banks, all of which are very exposed. The site has a good example of petrifying springs with tufa formations, with several species of bryophyte typical of the Cratoneurion. The springs occur along seepage zones in clay sea cliffs. A population of Branta leucopsis of international importance winters on Mutton Island, and Hydrobates pelagicus may still breed. Phalacrocorax carbo breeds on Mattle Island. The site holds nationally important wintering populations of Charadrius hiaticula, Calidris maritima, Calidris alba, Calidris alpina and Arenaria interpres. Cygnus cygnus and Pluvialis apricaria occur in small numbers.

4.3. VULNERABILITY

The littoral reef is used for the collection of shellfish, peeler crabs and algae, the effects of which are unknown. It is possible that all three activities have effects on both the target species and the wider ecology of the shore. Spanish Point is an important recreational area. The littoral reef is vulnerable to trampling, and sublittorally increased recreational diving could affect

fragile and delicate species such as Phakellia ventilabrum and Eunicella verrucosa. Coastal defence structures, which interfere with the natural functioning of habitats such as shingle and stony bank vegetation, have been constructed at Quilty. Further such works may be constructed in the future. Increase in fertiliser usage in the general area of Lough Donnell could affect water quality of the lagoon. Grazing by goats and rabbits on Mutton Island could lead to soil erosion. The presence of rats on Mutton Island could be affecting some of the nesting seabirds. Increase in the number of tourists to Mutton Island could also affect breeding birds.

4.4. SITE DESIGNATION:

4.5. OWNERSHIP

State: Department of the Marine

Private: multiple

4.6. DOCUMENTATION

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Kinahan, J.R. (1863). Notes on the marine fauna of the west coast of Clare. Proceedings of the Natural History Society of Dublin, 99-103.

Lloyd, C. (1982). Inventory of seabird breeding colonies in Republic of Ireland. Unpublished report, Forestry and Wildlife Service, Dublin.

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Site code: IE0001021 NATURA 2000 Data Form

5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES

5.1. DESIGNATION TYPES at National and Regional level:

CODE	% COVER
IE05	2

5.2. RELATION OF THE DESCRIBED SITE WITH OTHER SITES:

designated at National or Regional level:

TYPE CODE	SITE NAME	OVERLAP TYPE	% COVER
IE05	Mutton Island Wildfowl Sanctuary	+	2

designated at International level:

5.3. RELATION OF THE DESCRIBED SITE WITH CORINE BIOTOPE SITES:

Site code: IE0001021 NATURA 2000 Data Form

6. IMPACTS AND ACTIVITIES IN AND AROUND THE SITE

6.1. GENERAL IMPACTS AND ACTIVITIES AND PROPORTION OF THE SURFACE OF THE SITE AFFECTED

IMPACTS AND ACTIVITIES WITHIN the site

CODE	INTENSITY	% OF SITE	INFLUENCE
120	A **B** C	1	+ 0 **-**
140	A **B** C	3	+ 0 **-**
211	A **B** C	1	+ 0 **-**
220	A **B** C	1	+ **0** -
290	A **B** C	1	+ 0 **-**
300	A **B** C	1	+ 0 **-**
621	A **B** C	5	+ **0** -
622	**A** B C	2	+ 0 **-**
871	**A** B C	1	+ 0 **-**
910	A **B** C	1	+ 0 **-**
966	**A** B C	5	+ 0 **-**

IMPACTS AND ACTIVITIES AROUND the site

CODE	INTENSITY	INFLUENCE
120	A **B** C	+ 0 **-**
140	A **B** C	+ **0** -

6.2. SITE MANAGEMENT AND PLANS

BODY RESPONSIBLE FOR THE SITE MANAGEMENT

Mutton Island Wildfowl Sanctuary is managed as a No-Shooting Area by Duchas the Heritage Service. The remainder of the site will be managed both privately and by the State.

SITE MANAGEMENT AND PLANS

A Management plan for the conservation of this site is in preparation.

7. MAPS OF THE SITE

- Physical map

- Aerial photograph(s) included:

NUMBER	AREA	SUBJECT	DATE
047-6258	Mid-Clare coast	Overview of site	199506

8. SLIDES

SITE SYNOPSIS

SITE NAME: MID-CLARE COAST SPA

SITE CODE: 004182

This site extends along the Co. Clare coastline in a south-south-westerly direction from Spanish Point (3 km west of Milltown Malbay) to just west of Doonbeg Bay, a distance of some 14 km. It comprises the mainland shoreline, Mutton Island and Mattle Island, a series of rocky reefs and the open marine water of Mal Bay between the islands and the mainland. Underlying the site are Carboniferous grits which are bedded at a low angle and which give rise to surf conditions in places along the coast. The headlands and islands experience some of the most severe conditions of exposure in Ireland.

The mainland shoreline is mostly rocky or stony, though there are several sandy beaches and areas of intertidal flats. There are excellent examples of littoral reef communities, which have extremely high species richness and include uncommon species such as *Paracentrotus lividus* and *Bifurcaria bifurcata*. Sublittorally, the area is important for its deep, exposed reef communities that are characterized by unusual and delicate, erect sponges, including the fragile anthozoan *Eunicella verrucosa*, the rare sponge *Tetilla zetlandica* and the anthozoan *Parazoanthus axinellae*.

Shingle or stony banks are found at the base of cliffs and at the head of bays. Due to their exposure these support a sparse cover of vegetation including such species as Sea Beet (*Beta vulgaris* subsp. *maritima*), Orache (*Atriplex* spp.), Sea Mayweed (*Matricaria maritima*), Silverweed (*Potentilla anserina*) and Sea-milkwort (*Glaux maritima*). Small sand dune systems are found near Spanish Point, about Lurga Point and further south. The stretch of coastline between Quilty and Lurga Point has extensive areas of mud and sand flats and supports nationally important bird populations. Further intertidal flats occur at Doughmore Bay and Doonbeg Bay.

Mutton Island is a medium-sized, uninhabited, island situated approximately 1 km from Lurga Point. It is a fairly low-lying island, rising to 28 m in the west where some cliffs occur. The south and eastern shores are low-lying and comprised of cobbles and boulders. Several small sandy coves exist. Much of the interior of the island is unmanaged dry grassland with a maritime character. Some of the plants present reflect the past agricultural activities. Wet grassland also occurs and, in places, heath vegetation has developed. A small freshwater pond occurs on the island. The island is grazed in summer. A group of littoral reefs occur to the north, notably Carrickaneelwar and Seal Rock. Mattle Island is a small island situated approximately 2 km south of Mutton Island. It is a low-lying island, rising to only 12 m in the central area. The island is highly exposed to the force of the Atlantic Ocean. The terrestrial component of the island is dominated by maritime grassland.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Barnacle Goose, Ringed Plover, Sanderling, Purple Sandpiper, Dunlin and Turnstone. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is of ornithological importance for a range of both breeding and wintering birds. Storm Petrel has long been known to breed on Mutton Island, though there has never been a quantitative estimate and there is no recent proof of breeding. Rats are common on the island and if a colony still exists it is likely to be small. It is possible that Storm Petrel could also breed on Mattle Island but there is no proof of this.

Mattle Island supports a nationally important breeding colony of Cormorant, with 60 nests present in May 1990. Both Mutton and Mattle have breeding Shag, estimated at less than 40 pairs in total in 1990. Both islands have nesting Herring Gull (probably less than 40 pairs) and Great Black-backed Gull (possibly up to 70 pairs), while Mutton Island has Lesser Black-backed Gull (24 pairs in 1995) and Common Gull (*c.* 10 pairs in 1995). Black Guillemot breed at least on Mutton Island (7 pairs in 1990). The nesting seabirds utilise the shallow waters which surround the island for foraging and socializing. An up-to-date survey of all breeding seabirds on the islands is required.

An important population of Barnacle Goose winters on Mutton Island, with birds occasionally visiting Mattle Island and feeding sites on the mainland. Mutton provides both feeding and roosting sites. The population is of national importance though at times exceeds the threshold for international importance (350 birds were present in spring 1994 and 215 in spring 1999).

The mainland shore is important for wintering waders, especially Ringed Plover (316), Purple Sandpiper (393), Dunlin (2,708), Sanderling (272) and Turnstone (571) - figures given are average peaks for the 5 winters 1995/96-1999/00; all of these populations exceed the respective thresholds for national importance. Other species which occur in winter include Golden Plover, Grey Plover, Oystercatcher, Lapwing, Curlew and Redshank. Some of the waders may commute to the islands. The shallow seas are frequented by both Great Northern Divers and Red-throated Divers.

A variety of terrestrial birds occur on the island and are presumed to breed there. These include Skylark, Meadow Pipit, Rock Pipit, Pied Wagtail, Raven, Swallow, Wheatear and Stonechat.

Grey Seal occur regularly in the area and haul out on the islands. Mutton Island has a high density of hares, and also has rabbits and feral goats.

The presence of rats on Mutton Island, and possibly Mattle, is considered to be an important reason for the relatively low numbers of nesting seabirds. Grazing by goats and rabbits on Mutton Island could lead to soil erosion. Increase in the number of tourists to Mutton Island could also affect breeding birds.

This site is of high ornithological importance. It supports a nationally important population of wintering Barnacle Goose, as well as nationally important numbers of five wader species. In summer it has nationally important breeding colonies of Cormorant and Great Black-backed Gull, as well as range of other seabird species. Storm Petrel may still breed. Of particular note is that Barnacle Goose, Storm Petrel, Golden Plover, Great Northern Diver and Red-throated Diver are listed on Annex I of the E.U. Birds Directive.

Conservation Objectives for Mid-Clare Coast SPA [004182]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, is stable or increasing, and
- the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population data on the species concerned indicate that it is maintaining itself, and
- the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- *Phalacrocorax carbo [breeding]*
- *Charadrius hiaticula [wintering]*
- *Calidris alba [wintering]*
- *Calidris maritima [wintering]*
- *Calidris alpina [wintering]*
- *Arenaria interpres [wintering]*
- *Branta leucopsis [wintering]*

Site code: IE0004182 NATURA 2000 Data Form

NATURA 2000

STANDARD DATA FORM

FOR SPECIAL PROTECTION AREAS (SPA)

FOR SITES ELIGIBLE FOR IDENTIFICATION AS SITES OF COMMUNITY IMPORTANCE (SCI)

AND

FOR SPECIAL AREAS OF CONSERVATION (SAC)

Site code: IE0004182 NATURA 2000 Data Form

1. SITE IDENTIFICATION

1.1. TYPE	*1.2. SITE CODE*	*1.3. COMPILATION DATE*	*1.4. UPDATE*
J	IE0004182	201002	

1.5. RELATION WITH OTHER NATURA 2000 SITES:

1.6. RESPONDENT(S):

National Parks & Wildlife Service of the Department of the Environment, Heritage and Local Government. 7 Ely Place, Dublin 2, Ireland.

1.7. SITE NAME:

Mid-Clare Coast SPA

1.8. SITE INDICATION AND DESIGNATION/CLASSIFICATION DATES:

DATE SITE PROPOSED AS ELIGIBLE AS SCI:	*DATE CONFIRMED AS SCI:*
DATE SITE CLASSIFIED AS SPA:	*DATE SITE DESIGNATED AS SAC:*
200401	

Site code: IE0004182 NATURA 2000 Data Form

2. SITE LOCATION

2.1. SITE CENTRE LOCATION

LONGITUDE

W 9 29 25

W/E (Greenwich)

LATITUDE

52 47 46

2.2. AREA (HA):

4640.65

2.3. SITE LENGTH (KM):

2.4. ALTITUDE (M):

MINIMUM	MAXIMUM	MEAN
-30	28	-10

2.6. BIOGEOGRAPHIC REGION:

Alpine	Atlantic	Boreal	Continental	Macaronesian	Mediterranean
☐	☑	☐	☐	☐	☐

3. ECOLOGICAL INFORMATION

3.1. HABITAT types present on the site and assessment for them:

ANNEX I HABITAT TYPES:

CODE	%COVER	REPRESENTATIVITY	RELATIVE SURFACE	CONSERVATION STATUS	GLOBAL ASSESSMENT

3.2. SPECIES

covered by Article 4 of Directive 79/409/EEC

and

listed in Annex II of Directive 92/43/EEC

and

site assessment for them

Site code: IE0004182 NATURA 2000 Data Form

3.2.a. BIRDS listed on Annex I of Council directive 79/409/EEC

CODE	NAME	POPULATION				SITE ASSESSMENT			
		Resident	Migratory			Population	Conservation	Isolation	
			Breed	Winter	Stage				
A140	Pluvialis apricaria			1446 i		C	B	C	
A003	Gavia immer			9 i		C	B	C	
A045	Branta leucopsis			254 i		B	A	C	A

3.2.b. Regularly occuring Migratory Birds not listed on Annex I of Council directive 79/409/EEC

CODE	NAME	POPULATION				SITE ASSESSMENT			
		Resident	Migratory			Population	Conservation	Isolation	
			Breed	Winter	Stage				
A182	Larus canus		10 p			C	B	C	
A017	Phalacrocorax carbo		60 p			C	B	C	
A183	Larus fuscus		24 p			C	B	C	
A179	Larus ridibundus			329 i		C	B	C	
A137	Charadrius hiaticula			316 i		B	A	C	
A141	Pluvialis squatarola			36 i		C	B	C	
A142	Vanellus vanellus			1252 i		C	B	C	
A144	Calidris alba			272 i		B	A	C	A
A148	Calidris maritima			393 i		B	A	C	A
A149	Calidris alpina			2708 i		B	A	C	
A160	Numenius arquata			486 i		C	B	C	
A162	Tringa totanus			77 i		C	B	C	
A169	Arenaria interpres			571 i		B	A	C	A
A179	Larus ridibundus			304 i		C	B	C	
A182	Larus canus			426 i		C	B	C	
A018	Phalacrocorax aristotelis		<40 p			C	B	C	
A184	Larus argentatus		<40 p			C	B	C	

3.2.c. MAMMALS listed on Annex II of Council directive 92/43/EEC

3.2.d. AMPHIBIANS and REPTILES listed on Annex II of Council directive 92/43/EEC

3.2.e. FISHES listed on Annex II of Council directive 92/43/EEC

3.2.f. INVERTEBRATES listed on Annex II of Council directive 92/43/EEC

3.2.g. PLANTS listed on Annex II of Council directive 92/43/EEC

3.3. Other Important Species of Flora and Fauna

(B = Birds, M = Mammals, A = Amphibians, R = Reptiles, F = Fish, I = Invertebrates, P = Plants)

Site code: IE0004182 NATURA 2000 Data Form

4. SITE DESCRIPTION

4.1. GENERAL SITE CHARACTER:

Habitat classes	% cover
Marine areas, Sea inlets	91
Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	2
Coastal sand dunes, Sand beaches, Machair	1
Shingle, Sea cliffs, Islets	5
Dry grassland, Steppes	1
Total habitat cover	**100 %**

Other site characteristics

The site stretches for approximately 14 km of the west coast of Clare, from Spanish Point to Rinnammryal just west of Doonbeg. The mainland shoreline, which is highly exposed to the force of the Atlantic, is mostly rocky and stony, with well-developed littoral reed communities. There are several sandy beaches, such as at white strand, as well as areas of intertidal flats. The site has significant examples of vegetated shingle and stony banks, all of which are very exposed. Several islands are included, the largest of which is Mutton Island, a medium sized, uninhabited island, situated approximately 1 km from Lurga Point. Mutton Island is dominated by a grassy sward, with some low cliffs at the west side. Mattle Island is a small island situated approximately 2 km south of the larger Mutton Island. It is a low-lying island, rising to only 12 m in the central area. A group of littoral reefs occur to the north of Mutton Island, notably Carrickaneelwar and Seal Rock. A large marine area, which has very good examples of sub-tidal reefs, is included in the site.

4.2. QUALITY AND IMPORTANCE:

An important population of Branta leucopsis, which at times exceeds the threshold for national importance, winters on Mutton Island. Site is of particular importance for wader species of rocky and sandy shores, with nationally important wintering populations of Charadrius hiaticula, Calidris maritima, Calidris alba, Calidris alpina and Arenaria interpres. The Calidris maritima and Arenaria interpres populations are regularly the largest in the country and comprise 11.5% and 4.3% of the respective all-Ireland totals. Gavia immer is regular in winter. Mutton and Mattle Islands support a range of breeding seabirds, with a nationally important population of Phalacrocorax carbo, as well as populations of Phalacrocorax aristotelis, Larus canus, Larus fuscus, Larus argentatus, Larus marinus and Cepphus grylle.

4.3. VULNERABILITY

There are no known threats to the wintering waders. Commercial or amenity related development on Mutton Island could cause disturbance to the wintering geese and breeding seabirds. Also, grazing by goats and rabbits could lead to soil erosion. Presence of rats on Mutton Island, and possibly Mattle Island, is considered a main reason for the relatively low numbers of nesting seadbirds.

4.4. SITE DESIGNATION:

4.5. OWNERSHIP

State: Department of Communications, Marine & Natural Resources

Private: multiple

4.6. DOCUMENTATION

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Site code: IE0004182 NATURA 2000 Data Form

5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES

5.1. DESIGNATION TYPES at National and Regional level:

CODE	% COVER
IE05	1

5.2. RELATION OF THE DESCRIBED SITE WITH OTHER SITES:

designated at National or Regional level:

TYPE CODE	SITE NAME	OVERLAP TYPE	% COVER
IE05	Mutton Island Wildfowl Sanctuary	+	1

designated at International level:

5.3. RELATION OF THE DESCRIBED SITE WITH CORINE BIOTOPE SITES:

Site code: IE0004182 NATURA 2000 Data Form

6. IMPACTS AND ACTIVITIES IN AND AROUND THE SITE

6.1. GENERAL IMPACTS AND ACTIVITIES AND PROPORTION OF THE SURFACE OF THE SITE AFFECTED

IMPACTS AND ACTIVITIES WITHIN the site

CODE	INTENSITY	% OF SITE	INFLUENCE
140	A **B** C	1	+ **0** -
211	A **B** C	1	+ **0** -
220	A **B** C	1	+ **0** -
621	A **B** C	5	+ **0** -
622	A **B** C	5	+ **0** -

IMPACTS AND ACTIVITIES AROUND the site

CODE	INTENSITY	INFLUENCE
140	A **B** C	+ **0** -

6.2. SITE MANAGEMENT AND PLANS

BODY RESPONSIBLE FOR THE SITE MANAGEMENT

Mutton Island Wildfowl Sanctuary is managed as a No-Shooting Area by the National Parks and Wildlife Service.

SITE MANAGEMENT AND PLANS

A Conservation Plan for the management of the site is in preparation.

7. MAPS OF THE SITE

- Physical map

- Aerial photograph(s) included:

8. SLIDES

Clare County Council Environment Section

Bathing Water Quality Report

Bathing Area: WHITESTRAND, DOONBEG

Date	23/05/2011	07/06/2011	20/06/2011	05/07/2011	18/07/2011	02/08/2011	15/08/2011	29/08/2011	14/09/2011
Time	11:45	10:00	11:20	12:00	11:00	11:10	11:45	10:30	13:00
Parameter									
Coliform Bacteria	<10	187	<10	10	10	109	31	10	20
E - Coli	<10	86	<10	10	10	85	31	10	<10
Interstinal Enterococci	33	90	10	10	<10	40	0	10	<10
Colour	33	24	16	15	26	6	13	6	79
Visual Inspection	clear	clear	clear	clear	clear	clear	clear	clear	clear
Salinity	33.8	34.2	34.1	34.4	33.8	33.5	34	34.3	34.6

N.D. =	**Not Detected.**
N.M. =	**Not Measured.**
	Exceedance of Blue Flag Limit

Clare County Council Environment Section

Bathing Water Quality Report

Bathing Area: **WHITESTRAND, DOONBEG**

Parameter	Blue flag limit	No of Samples	Breeches of Blue flag limit	% Compliance
Faecal Coliforms (E.co	< or = 250/100ml	9	0	100
Intestinal Enterococci	< or = 100/100ml	9	0	100

Bathing Waters

Bathing Water Quality Report

Bathing Area: SPANISH POINT BEACH

Date	23/05/2011	07/06/2011	20/06/2011	05/07/2011	18/07/2011	02/08/2011	15/08/2011	29/08/2011	14/09/2011
Time	12:00	11:15	12:15	12:55	12:00	12:10	12:45	11:30	10:00
Parameter									
Coliform Bacteria	10	395	10	10	31	10	135	52	41
E - Coli	<10	395	10	10	20	10	20	20	20
Interstinal Enterococci	20	30	10	30	<10	<10	<10	<	<10
Colour	35	14	10	7	15	8	21	11	5
Visual Inspection	clear	clear	clear	clear	clear	clear	clear	clear	clear
Salinity	32.3	33.5	34	33.7	33.8	33.4	33	33.7	33.6

N.D. =	**Not Detected.**
N.M. =	**Not Measured.**
	Exceedance of Blue Flag Limit

Clare County Council Environment Section

Bathing Water Quality Report

Bathing Area: **SPANISH POINT BEACH**

Parameter	Blue flag limit	No of Samples	Breeches of Blue flag limit	% Compliance
Faecal Coliforms (E.co	< or = 250/100ml	9	1	89
Intestinal Enterococci	< or = 100/100ml	9	0	100

Clare County Council Environment Section

Bathing Water Quality Report

Bathing Area: WHITESTRAND, MILTOWN MALBAY

Date	23/05/2011	07/06/2011	20/06/2011	05/07/2011	18/07/2011	02/08/2011	15/08/2011	29/08/2011	14/09/2011
Time	12:20	11:40	13:00	13:30	12:30	12:30	13:15	12:15	10:15
Parameter									
Coliform Bacteria	86	**3654**	<10	60	120	20	31	161	426
E - Coli	41	**2245**	<10	60	95	20	<10	86	63
Interstinal Enterococci	<10	40	<10	20	<10	<10	10	10	20
Colour	64	74	21	36	23	14	35	17	38
Visual Inspection	clear	clear	clear	clear	clear	clear	clear	clear	clear
Salinity	34.1	30.7	34.5	34	33.7	33.7	34	33.6	33.4

N.D. =	**Not Detected.**
N.M. =	**Not Measured.**
	Exceedance of Blue Flag Limit

Clare County Council Environment Section

Bathing Water Quality Report

Bathing Area: **WHITESTRAND, MILTOWN MALBAY**

Parameter	Blue flag limit	No of Samples	Breeches of Blue flag limit	% Compliance
Faecal Coliforms (E.cc	< or = 250/100ml	9	1	89
Intestinal Enterococci	< or = 100/100ml	9	0	100

Clare County Council Environment Section

Bathing Water Quality Report

Bathing Area: SEAFIELD, QUILTY

Date	23/05/2011	07/06/2011	20/06/2011	05/07/2011	18/07/2011	02/08/2011	15/08/2011	29/08/2011	14/09/2011
Time	11:30	10:45	11:50	12:30	11:00	11:45	12:15	11:00	13:35
Parameter									
Coliform Bacteria	135	98	<10	10	20	<10	10	<10	<10
E - Coli	41	86	<10	10	10	<10	10	<10	<10
Interstinal Enterococci	31	<10	<10	10	<10	20	0	<10	<10
Colour	26	24	12	26	33	32	18	5	21
Visual Inspection	clear	clear	clear	clear	clear	clear	clear	clear	clear
Salinity	33.9	34.5	34.3	34	33.7	33.8	33.6	34	34.5

N.D. =	**Not Detected.**
N.M. =	**Not Measured.**
	Exceedance of Blue Flag Limit

Clare County Council Environment Section

Bathing Water Quality Report

Bathing Area: **SEAFIELD, QUILTY**

Parameter	Blue flag limit	No of Samples	Breeches of Blue flag limit	% Compliance
Faecal Coliforms (E.co	< or = 250/100ml	9	0	100
Intestinal Enterococci	< or = 100/100ml	9	0	100

Bathing Water Profile

Bathing area	White Strand, Doonbeg
Bathing water ID	IESHBWT080_0100_0100
Competent Authority	Clare County Council

Version number: 1	**Date: 24/03/2011**	**Next review date: 24/03/2015**

White Strand,
Doonbeg.

Designated
Bathing Water.

Designated bathing area
Monitoring point

Map 1: Location and extension of bathing water including location of monitoring point

Description of the Bathing Water

Location and Extent
The bathing water at White Strand, Doonbeg is located along the south western coast of Clare as shown in Map 1. The designated bathing area is approximately 0.04 km^2 in size and extends 230m along the shoreline.

Name of River Basin District
Shannon River Basin District.

Waterbody
White Strand beach is located in Doonbeg Bay Coastal Waterbody (Waterbody Code SH_080_0000). A number of first order streams discharge into Doonbeg Bay, both north and south of the designated bathing area. There is no delineated catchment discharging into White Strand, however, two catchments discharge into Doonbeg Bay.

Main Features

Type of bathing water:
White Strand is a sandy beach, located in a rural area along the south-west coast of County Clare.

Flora/Fauna /riparian zone
The marine riparian zone at White Strand is classified as semi-natural. The beach faces north-east into Doonbeg Bay. Access to the beach is via concrete steps in the south-west corner of the beach. A concrete wall extends the length of the south-west portion of the beach, a grassy verge and local road run parallel to this wall.

Land use
The predominant land-use both in the immediate vicinity of, and further outside, the designated bathing area is agriculture.

Tidal Range
The tidal range in Doonbeg Bay is classed as mesotidal with ranges varying between 2m and 4m. The wave exposure is classed as moderate.

Water Depth
The depth of water increases slowly and steadily north east towards the centre of the bay, before increasing westwards towards the horizon.

Facilities and Activities

Facilities
Facilities and activities at White Stand, Doonbeg comprise of the following:

- Lifeguard hut and life rings
- Toilets
- Litter bins
- Recycling facilities
- First aid
- Information point
- Emergency telephone located beside lifeguard hut
- Picnic area
- Launching slipway
- Parking

Map 2, attached, is a copy of the map displayed on the notice board at the designated bathing area. This map displays the facilities and activities at White Strand, Doonbeg. It should be noted that the graphic representations of storm water inverts in Map 2 do not depict actual stream flows and any associated potential pollutant pathways onto the beach.

Visitor Numbers
White Strand has a seasonal population of up to 1,200 people. During the bathing season, it is estimated that a maximum number of 1,000 visitors can occur a day. However, visitor numbers to White Strand Bathing Area average 200 persons per day.

Activities
Surfing, including wind surfing, angling and horse riding are all activities that take place at White Strand, Doonbeg.

Clare County Council introduced Beach byelaws in May 2008 under Part 19 Local Government Act, 2001, & Local Government Act, 2001 (Commencement) Order 2006. Under these bye-laws the following activities are prohibited:

- Horse riding (between 11am and 6pm)
- Dog walking (between 11am and 6pm)

Description of the contributing catchment

The White Strand bathing area is located along the south western coast of Co. Clare in the Shannon River Basin District.

Contributing Catchment
Three first order streams discharge into Doonbeg Bay, north and south of the designated bathing area. There is no delineated catchment discharging into White Strand. Two catchments discharge into Doonbeg Bay. A number of smaller catchments feed these two catchments. Refer to Table 1, below, and Map 3 attached. Map 5 and map 6, attached, both detail the potential pressures within the bathing water catchment.

Waterbodies draining to the bathing area

Code	*Name*	*Current water quality Status*
SH_28_734	SH_Doonbeg_DoonbegMAIN_1Lower	Good
SH_28_733	SH_Doonbeg_DoonbegMAIN_1Mid	Good
SH_28_706	SH_Doonbeg_DoonbegMAIN_1Upper	High
SH_28_718	SH_Doonbeg_DoonbegTRIB_2Kilmahil	Poor
SH_28_346	SH_Doonbeg_DoonbegTRIB_2Clooncoorha	Good
SH_28_709	SH_Creegh_Creegh_1Main	Good

Table 1: List of the waterbodies in the contributing catchment

The Doonbeg River Catchment and the Creegh River Catchment are the main freshwater inputs to Doonbeg Bay, which may impact on water quality at the designated bathing area at White Strand, Doonbeg.

The Doonbeg River rises near Ballyduneen at an elevation of 50m OD, approximately 26km east of the mouth of the river where it flows into Doonbeg Bay. The Doonbeg River flows through three catchments: SH_Doonbeg_DoonbegMAIN_1Upper, SH_Doonbeg_DoonbegMAIN_1Mid and SH_Doonbeg_Doonbeg_Lower. Fifteen unnamed streams feed this river body; two of these streams drain the following smaller catchments:

- SH_Doonbeg_DoonbegTRIB_2Kilmahil
- SH_Doonbeg_DoonbegTRIB_2Clooncoorha

The Doonbeg River flows westwards from its source. It passes through Cooraclare village and from here the river flows approximately 11km in a northwest direction towards Doonbeg. After Doonbeg, the river passes through Doonbeg Lough and forms Doonbeg Estuary. Doonbeg Estuary discharges northwest into Doonbeg Bay.

The Creegh River rises between Doolough and Glenmore at an elevation of approximately 168m OD. From its source, the Creegh River flows southwest for approximately 6.0km, at this point it is fed by the Greygrove River, which drains the upper reaches of the catchment along its 15km course. Both rivers converge here and the Creegh River continues to flow west towards Doonbeg Bay. Along its course, three unnamed streams and two unnamed rivers feed the main river body. Approximately 6km from Doonbeg

Bay, the Creegh River and the Skivileen River converge, from here the Skivileen River continues in a northwest direction where it discharges into Doonbeg Bay.

Immediately north of the designated bathing area two small stream discharges to the bay as detailed in Map 3 attached. These streams are approximately 1km in length. Approximately 900m south of the designated bathing area another stream discharges into Doonbeg Bay, this stream is 2km in length. On the northeast reaches of Doonbeg Bay, a stream approximately 2.79km in length discharges into the bay.

Table 1 lists the waterbodies that make up the contributing catchment. The name, code and current water quality status of the waterbody as assigned under the Shannon River Basin Management Plan (July 2010) is detailed. Overall the water quality status of the catchments draining into Doonbeg Bay is good. There are two exceptions to this: the status of the upper Doonbeg catchment is high; and the Kilmihil stream, which drains into the middle Doonbeg catchment, is classed as having poor status. Refer to Map 4 attached, which gives a good visual summary of the water quality status of the waterbodies within the Bathing Water catchment.

Land-use

In the middle and lower reaches of the Creegh catchment, agriculture is the predominant land use and the land is used for pasture. Five smaller individual areas of non-irrigated arable land and land principally occupied by agriculture with areas of natural vegetation also occur. The agricultural risk rating associated with the land used for pasture is moderate, while the risk from agricultural land used for the other two purposes is negligible. Wetlands and forestry, representing peat bogs and transitional woodland scrub, respectively, also make up a small percentage of land use in the lower and middle reaches of the catchment. Forests and wetlands are the predominant land use in the upper reaches of the catchment (Ben Dash, Forestry). In this area, forests represent coniferous forests and transitional woodland scrub while wetlands are peat bogs. Small areas of agricultural land used for pasture are also identified in the upper reaches of the catchment and carry a low risk of pollution. Under the Shannon River Basin Management Plan (July 2010), this waterbody is classified as having good status.

The predominant land uses in the lower and middle Doonbeg catchments are agricultural land used for pasture. There are two small areas of non-irrigated arable land in each catchment. The agricultural risk rating for land used for pasture is moderate, while the risk rating for non-irrigated arable land is negligible. A number of small areas in both catchments are classed as wetland and forestry, peat bogs and transitional woodland scrub, respectively. There is one urban area in the middle Doonbeg catchment; this is the town of Kilmihil. In the upper Doonbeg catchment, the predominant land use is also agricultural land used for pasture, and the risk rating is classed as low. The risk rating associated with smaller agricultural land occupied by agriculture with areas of natural vegetation is also classed as low. In the upper Doonbeg catchment a mix of wetlands and forestry occur; peat bog and transitional woodland scrub, respectively, account for a large proportion of the land use. The status of the waterbodies in the lower, middle and upper Doonbeg catchments are good, good and high, respectively.

Two catchments, Kilmahil and Clooncoorha, feed the lower and middle Doonbeg catchments, respectively. The predominant land use in the Kilmahil catchment is agricultural land used for pastures. In the eastern portions of the catchment, wetlands (peat bogs) and forestry (natural grassland and transitional woodland scrub) also occur. The predominant land use in the Clooncoorha catchment is agricultural land used for pasture. Occasional wetlands (peat bogs) and forestry (transitional woodland scrub) occur along the catchment perimeter.

The land use in the vicinity of the unnamed streams that discharge north and south of the designated area, and the unnamed stream that discharges into water on the northwest reaches of the Doonbeg Bay, is agricultural land used for pasture. The agricultural risk rating associated with this land is moderate.

Topography

The catchments which drain into Doonbeg Bay consist generally of gently sloping hills and valleys rising in the upper Doonbeg and upper reaches of the Creegh catchment, to a maximum height of 267m at Ben Dash. The land slopes gently towards Doonbeg Bay, where the land around the designated bathing area, the lower Doonbeg catchment and the lower reaches of the Creegh catchment is generally flat.

Soils, Subsoils and Bedrock

In the lower Doonbeg catchment, the predominant soil type is peat (both Allen and Allen cutover series) with occasional gleys (both Kilrush and Abbeyfeale non peaty phase series), brown podzolics (Mountcollins series) and peat (Aughty cutover) occurring throughout the catchment. In the middle

Doonbeg catchment brown podzolics (Mountcollins series) dominate with peats (Aughty cutover series) and gleys (Kilrush series) occurring intermittently throughout the catchment. In the upper Doonbeg catchment gleys (Kilrush series) are the predominant soil type, with peats (Aughty and Aughty cutover series) and brown podzolics (Mountcollins series) also occurring occasionally throughout the catchment.

In the Creegh catchment, the predominant soil type varies between the lower, middle and upper reaches of the catchment. In the lower reaches near the coast, gleys (Kilrush series) are the most common soil type, areas of peat (Aughty cutover series) occur throughout its extent. Smaller areas of brown podzolics (Mountcollins series) and gleys (Abbeyfeale non peaty phase) also feature intermittently. In the middle reaches of the catchment, peats (Aughty cutover series) and brown podzolics (Mountcollins series) predominate with occasional gleys (Kilrush series) also found here. In the upper reaches of the Creegh catchment peat (Aughty series) predominates.

The soils overlying the area south west of the designated bathing area are gleys (Kilrush series) and brown earths (Tullig series), while the soils overlying the area north east of Doonbeg bay are gleys (Kilrush series) and regosols (Seafield series).

The lower Doonbeg catchment, the lower reaches of the Creegh catchment and the areas in the vicinity of Doonbeg Bay that are not part of a delineated catchment are underlain by Namurian siltstone and sandstone (Gull Island Formation). The middle and upper reaches of the Creegh catchment, and the middle and upper Doonbeg catchment are underlain by Namurian sandstone, siltstone and mudstone (Central Clare Group). Both the Gull Island Formation and Central Clare Group are classed as Locally Important aquifers (LI) which are moderately productive only in local zones. The aquifer vulnerability classification varies significantly throughout the catchments draining into Doonbeg Bay. In the immediate vicinity of the designated bathing area, the vulnerability varies between high and extreme, aquifer vulnerability is particularly extreme in areas where rock outcrops at the surface. Apart from an area in the lower Doonbeg catchment, where the aquifer vulnerability is classed as low, the aquifer vulnerability for the middle and upper Doonbeg catchments and the Creegh catchment is high to extreme.

Population centres

The catchments which drain into Doonbeg Bay are mainly rural with small population centres. In the Creegh catchment, the only notable population centre is the village of Creegh (457 people), while the main population centres in the lower Doonbeg catchment is (228 people). Population estimates are according to the 2006 Census.

Areas of special interest

The Carrowmore Dunes SAC spans from Carrowmore point, north of Doonbeg Bay to the Doonbeg estuary in the south, it does not extend as far as the designated bathing area. The site is an SAC selected for fixed dunes, embryonic shifting dunes and reefs, habitats listed as Annex 1 on the EU Habitats Directive. The Mid Clare Coast SPA, extends approximately 14km along the County Clare coastline, from Spanish Point in the north to west of Doonbeg Bay, intertidal flats occur across Doonbeg Bay.

Rainfall

The following details area based on information obtained from the Irish Meteorological Services 1961 – 1990 data

Precipitation levels fall under two categories in this bathing water catchment. The upper reaches of the Creegh catchment and the upper Doonbeg catchment experience annual mean rainfall of 1,200-1,400mm. The remainder of the catchments which drain into Doonbeg Bay: the middle and lower reaches of the Creegh catchment; the middle and lower Doonbeg catchments; and the land in the vicinity of the designated bathing area at White Strand, has an annual mean rainfall of 1,000 to 1,200mm.

At Shannon airport the highest average rainfall was in December (mean monthly total of 99mm) and the lowest was in April (mean monthly total of 55.7mm). The average yearly rainfall was 926.7 mm at Shannon Airport.

Part 2
Details on the location of the monitoring point

Grid Reference for monitoring location (x,y)	462,637, 5,843,909 (See Map 1)
Reason for selection of monitoring point	Location where most bathers swim due to its location below the lifeguard hut

Part 3
Qualitative assessment of water quality at the bathing site

As detailed in Table 2, overleaf, during the period 2003-2010 the bathing area in White Strand was compliant with mandatory values under the Quality of Bathing Water Regulations, 1992. During the period 2004 to 2010, the bathing water was in compliance with guideline values under the Bathing Water Quality Directive 76/160/EEC (Table 3). In 2003, as outlined in Tables 3 and 4, non-compliance with the parameters Faecal Coliforms, granted a departure. The White Strand bathing area was awarded a Blue Flag from An Taisce for each bathing season during the period 2000 – 2004 and 2006 – 2010. In 2005, the White Strand bathing area was not awarded a Blue Flag due to inadequate safety and services at the site.

Parameter	**Mandatory values**		**% test results higher than mandatory value**										**Accepted % test results higher than mandatory values**	
	No. per 100 mls		**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	
Total Coliforms	5000	10000	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	20 %	5 %
Faecal Coliforms	1000	2000	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0%	0 %	20 %	5 %
Faecal Strepto-cocci	300		0%	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	5 %	
Compliant			**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**			

Table 2: Bathing Water microbiological parameters tested at *White Strand Bathing area* and the mandatory quality standards achieved for the period 2003 to 2010 under the Quality of Bathing Water Regulations, 1992

Parameter	**Guideline values**	**% test results higher than guideline value**											**Accepted % test results higher than guideline value**
		2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	
Total Coliforms	500/100 ml	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	20 %
Faecal Coliforms	100/100 ml	0 %	0 %	0 %	8%	0 %	0 %	0 %	0 %	0 %	0 %	0 %	20 %
Faecal Streptococci	100/100 ml	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	10 %
Compliant		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	

Table 3: Bathing Water microbiological parameters tested at *White Strand Bathing area* and the guideline quality standards achieved for the period 2001 to 2010 under the Bathing Water Quality Directive 76/160/EEC

Table 4 summarises exceedances of guideline values. An exceedance was recorded in 2003. This exceedance was not attributed to a particular source or cause.

Year	No.of samples taken	No. samples in exceedance of physico chemical parameters	[1]No. of samples in exceedance of microbiological parameters	Date of exceedance/s	Parameters in exceedance	Explanation for exceedance
2000	13	0	0	n/a	n/a	n/a
2001	12	0	0	n/a	n/a	n/a
2002	12	0	0	n/a	n/a	n/a
2003	13	0	1	10/6	Faecal Coliforms	No explanation
2004	12	0	0	n/a	n/a	n/a
2005	14	0	0	n/a	n/a	n/a
2006	13	0	0	n/a	n/a	n/a
2007	13	0	0	n/a	n/a	n/a
2008	13	0	0	n/a	n/a	n/a
2009	10	0	0	n/a	n/a	n/a
2010	8	0	0	n/a	n/a	n/a

Table 4: Summary of exceedances of physico chemical and microbiological parameters during the period 2003-2010

A report by Mr. Bartholomew Masterson, UCD, on *Retrospective Compliance of Clare Designate Bathing Waters with the Irish SI 79 of 2008 during the period 2002 –2009* assigns a classification under the Bathing Water Directive of **excellent**, for the bathing area at White Strand, for the period 2006 -2009. For the same period, 2006 –2009 Mr. Masterson has calculated an intestinal enterococci 95-percentile value of 39 for White Strand. This value equates to a Water Quality Impact Grade of **A**, which will be used in the Microbial Pollution Risk assessments in Part 4 of this BW Profile.

There have been no incidences of proliferation of macro algae from 2000-2010. However, a phytoplankton bloom was reported by locals in the vicinity of White Strand, Doonbeg, on the 4th August, 2003, a bank holiday Monday. As a precautionary measure the blue flag was immediately removed and the lifeguard was advising people not to swim until the incident was investigated. Clare County Council carried out a site investigation the 5th August 2003. By this stage the bloom had disappeared from the sea and there were no brown deposits evident on the sand or in the rock pools. Samples, taken by the locals, on 4th August 2010, were sent to the Irish Seaweed Center in University College Galway for examination. They were examined by Dr Stefan Kraan. Dr. Kraan confirmed that one of the samples contained small benthic diatoms. He advised that these diatoms are known to form brown/yellow mats on the sand in shallow waters and that during low tides these mats are visible as a brown deposit on the sand. No further incidences relating to phytoplankton bloom have been reported since.

Part 4
Identification and risk assessment of potential pressures (point and diffuse sources)

Description of potential pressures in the catchment assessed as posing no risk

1. Quarries:

Description of pressure: There are a number of small-scale quarries are located within the Doonbeg and Creegh catchments.

Description of risk assessment methodology and the results: There is no faecal contamination associated with mining

2. Waste Licence:

Description of pressure: Clean (Irl) Refuse & Recycling Ltd run the EPA licensed materials recovery facility located at Ballynagun West, near Creegh.

Description of risk assessment methodology and the results: This is a materials recovery facility, there is little microbiological contamination associated with this activity.

3. Licences issued under Section 4 of the Local Government (Water Pollution) Act 1977-1990.

Description of pressure: There are three licences issued under Section 4 of the Local Government (Water Pollution) Act 1977-1990 located within the catchments discharging into Doonbeg Bay.

Description of risk assessment methodology and the results: Table 5 details the type of risk assessment used and the results of the risk assessment carried out on WP Licences located within the catchment. It is considered that there is minimal risk to bathing water quality even in the event of a breakdown at one of these wastewater plants.

License	Population Size	River Flow	Sewage Treatment	Microbial Pollution Potential (Bartem and Rees, 2000)	WQI Grade	Microbial Pollution Risk (WHO 2003)
Lui na Greine, Cree	Small	N/A. Discharge to groundwater	Secondary	NA	A	**NA**
Clean (Irl) Refuse & Recycling Ltd	Small	Small. Two surface water discharge points; a land drain and tributary of the Creegh River.	Surface water runoff from the site is discharged surface water. Wastewater is discharged to groundwater following tertiary polishing	NA	A	**NA**
Tullagower Quarries, Kilrush	Small	Small. A land drain that discharges into a tributary of the Doonbeg River	N/A. Discharge is process and surface water runoff, not wastewater	N/A	A	**N/A**

Table 5: Microbial Pollution Risk Assessment for sewage discharges from WP Licences to waters

Description of potential pressures in the catchment assessed as posing a risk

1. Waste Water Treatment Plants (WWTP)

Description of pressure:
Two wastewater treatment plants were identified within the catchment.

Description of risk assessment methodology and the results
Table 6 and Table 7 details the type of risk assessment used and the results of the risk assessment carried out on the wastewater treatment plants located within the catchment. See Map 5, attached, for an overview of sewer line network and outfall locations.

WWTP	Population size	Treatment	Discharge Type	Microbial Pollution Potential (WHO 2003)	WQI Grade	Microbial Pollution Risk (WHO 2003)
Doonbeg	Small	Tertiary	Long outfall	Very Low	A	Very Low

Table 6: Wastewater treatment plant risk assessment

WWTP	Population Size	River Flow	Sewage Treatment	Microbial Pollution Potential (Bartem and Rees, 2000)	WQI Grade	Microbial Pollution Risk (WHO 2003)
Kilmihil	Small	Small	Secondary	Moderate*	A	Very Low

Table: 7 Wastewater treatment plant risk assessment

Note*: The final effluent discharge point from Kilmihil WWTP discharges to a tributary of the Doonbeg River approximately 20 km from the designated bathing area at White Strand. While the Bertram and Rees 2000 methodology gives a risk assessment result of *Moderate* it considered the actual risk is *Very Low* due to the occurrence of the discharge to a small tributary, prior to entering the larger waterbody of the Doonbeg River, in the upper reaches of the catchment.

Risk of short-term pollution (nature frequency and duration)
While the Microbial Pollution Risk associated with the Doonbeg and Kilmihil WWTP is an overall very low risk, there is an inherent risk that a wastewater treatment system may break down and, as there is no back up generator at the Doonbeg Treatment Plant, result in a poor quality discharge to receiving waters. In the unlikely event that this may occur the duration of short-term pollution would be very short.

Management measures taken/proposed to be taken including time scales
Regular maintenance and inspections of wastewater treatment plants to ensure that they are operating satisfactorily and in compliance with conditions of their EPA Wastewater Licences /certificates. In the event of a breakdown or malfunction at a WWTP staff responsible for bathing waters shall be notified immediately.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

2. Diffuse Pollution from unsewered areas

Description of pressure:
Apart from the villages of Doonbeg and Kilmihil, which are connected to a sewer network and local WWTP, the two catchments that discharge into Doonbeg Bay: the Doonbeg and Creegh catchments, are unsewered. In addition, two notable portions of land in the vicinity of Doonbeg Bay are unsewered: the immediate area surrounding the bathing area and a portion of land on the northeast reaches of Doonbeg Bay. Neither area is part of a designated catchment; however, both contain first order streams that drain into Doonbeg Bay. With the exception of Cooraclare, where the population density is 25-50 people per square km, the remaining unsewered areas of interest are scarcely populated, with a population density of 10-25 people per square km. See Map 5, attached, for an overview of unsewered properties, both residential and commercial, that are present within the bathing water catchment.

Description of risk assessment methodology and the results:
The immediate area surrounding the bathing area and a portion of land on the northeast reaches of Doonbeg Bay are unsewered. Soils in both areas are comprised mainly of gleys, brown earths and peats, thus indicating that these areas may have poor percolation of effluents. In addition, as mentioned above, a number of first order streams drain from these unsewered areas into the sea. Therefore, despite the fact that both areas are sparsely populated, there is an immediate risk of diffuse pollution from unsewered areas.

Therefore, despite the presence of a sewer network in the immediate vicinity of Doonbeg Bay, the unsewered areas on either side of the bay can be considered to pose a low risk to bathing water quality. The unsewered areas in the middle and upper reaches of the Doonbeg and Creegh catchments are considered to pose a very low risk due to low population density and distance from the bathing area.

Management measures taken/proposed to be taken including time scales:
Privately owned on site wastewater treatment systems shall be adequately maintained and checked so as to reduce the risk of a foul discharge to waters in including groundwater. Where wastewater treatment systems are deemed a risk to environment /public health enforcement action will be taken by Clare County Council under the Local Government (Water Pollution) Act 1977-2007 and /or Water Services Act 2007.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

3. Diffuse agriculture pollution

Description of pressure:
The main land use within the catchment is agriculture. Farming is not very intensive and is comprised mainly of small dairy and/or beef farms and their associated spreadlands.

Description of risk assessment methodology and the results:
The Microbial Pollution Potential (MPP) grades for risk from agriculture were calculated based on the distance from the bathing area and the agriculture risk associated with a particular area. Refer to Table 9. The agriculture risk is census data based on pressures from cattle and sheep (Department of Agriculture 2000), tillage (Department of Agriculture 2000), and pigs and poultry (Teagasc 2000). For the Water Framework Directive results have been applied to agriculture layers of the Corrine 2000 in MapInfo.

	Agriculture risk			
Distance (km) from bathing Area	High Risk	Moderate Risk	Low Risk	Negligible Risk
<1	Very high	High	Mod	Low
1-2	High	Mod	Low	Very Low
2-5	Mod	Low	Very Low	Very Low
>5	Low	Very Low	Very Low	Very Low

Table 9: Microbial Pollution Potential from diffuse agriculture sources (Clare County Council, 2010)

The Microbial Pollution Risk for a particular area within the bathing water catchment can then be graded, with reference to Map 6 attached. Refer to table 10, below, and Map 6, attached, for details of agricultural land use, agriculture risk type, distance from bathing area and microbial pollution risk.

Catchment ID	Agricultural land use	Agriculture Risk Type	Distance from bathing area	Microbial Pollution Potential	WQI Grade	Microbial Pollution Risk (WHO 2003)
Unclassified catchment adjacent to bathing area	Pastures	Moderate	<1km	High	**A**	**Moderate***
Unclassified catchment adjacent to Doughmore Bay	Pastures	Moderate	2-5km	Low	**A**	**Very Low**
Lower Doonbeg catchment-lower reaches	Pastures	Moderate	1-2km	Moderate	**A**	**Low**
Lower Doonbeg catchment-lower reaches	Non-irrigated arable land	Negligible	1-2km	Very Low	**A**	**Very Low**
Middle Doonbeg catchment	Pastures	Moderate	>5km	Very Low	**A**	**Very Low**

Middle Doonbeg catchment	Non-irrigated arable land	Negligible	>5km	Very Low	**A**	**Very Low**
Upper Doonbeg catchment	Non-irrigated arable land	Negligible	>5km	Very Low	**A**	**Very Low**
Upper Doonbeg catchment	Pastures and land principally used by agriculture with areas of natural vegetation	Low	>5km	Very Low	**A**	**Very Low**
Creegh Catchment-lower reaches	Pastures	Moderate	2-5km	Low	**A**	**Very Low**
Creegh Catchment-lower reaches	Non-irrigated arable land	Negligible	2-5km	Very Low	**A**	**Very Low**
Creegh Catchment-middle and upper reaches	Pastures	Moderate	>5km	Very Low	**A**	**Very Low**

Table: 10 Risk assessments for diffuse agriculture pollution

*****Although the agricultural risk rating associated with the land <1km from the designated bathing area is high, given the large bay into which this small area of land is draining, the risk rating has been reduced to moderate.

Risk of short-term pollution:
Within the immediate vicinity of the catchment there is a high risk of diffuse pollution from agriculture. Throughout the bathing season farmers are permitted to spread slurry, and other farm effluents, on spreadlands located within the immediate vicinity of the bathing area. Also, the soil types overlying the area: gleys, peats and brown earths, are generally impermeable. Therefore, there is a significant risk of runoff from slurry spreading to land drains and adjacent waters, which may have adverse effects on the water quality at the bathing area in White Strand. Due to the larger distances between the remaining areas of agricultural land located within the lower Doonbeg and Creegh catchments, and the bathing area, the risk microbial pollution for these areas is classed as low and very low.

Management measures taken/proposed to be taken including time scales:
Ensure that farmers are spreading slurry in accordance with the European Communities (Good Agriculture Practice for Protection of Waters) Regulations 2009. In this regard, it is not permitted to apply slurry to land within 48 hours of heavy rain being forecast. Enforcement notices will be issued to farmers who spread slurry contrary to the requirements of the European Communities (Good Agriculture Practice for Protection of Waters) Regulations 2010.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

4. Point Source Pollution from unsewered area – Clare County Council public toilets

Description of pressure:
Public toilet facilities are provided by Clare County Council at White Strand, Doonbeg. These facilities are served by a Biocycle unit before percolating to ground. Refer to Map 2 for location.

Description of risk assessment methodology and the results:
A Microbial Pollution Risk (MPR) of medium was assigned taking the following factors into account:

- The on-site wastewater treatment system is located in close proximity to the bathing area
- Soils in the immediate vicinity of the designated bathing area where the Clare County Council public toilets are located are gleys (Kilrush Series) which are poorly draining soils.

Risk of short-term pollution (nature frequency and duration)
The Microbial Pollution Risk has received a medium risk grade, due to close proximity of the on site treatment system to the designated bathing area. In addition, there is an inherent risk that a wastewater treatment system may malfunction and result in a poor quality discharge to receiving waters. In the unlikely event that this may occur the duration of short-term pollution would be very short.

Management measures taken/proposed to be taken including time scales
The biocycle unit shall be adequately maintained and checked such that there is no risk of a foul discharge to waters in including groundwater. In the event of a malfunction and /or a discharge of foul effluent from the septic tank / percolation area staff responsible for bathing waters shall be notified immediately.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

Part 5
Risk assessment for cyanobacteria.

Risk assessment for the proliferation of cyanobacteria	Current information suggests that the bathing water is not at risk of a proliferation of cyanobacteria
Details of proposed management measures	None necessary

Part 6
Risk assessment for macro-algae and phytoplankton

Risk assessment for the proliferation of macro-algae and phytoplankton	It is considered that there is a very low risk of a phytoplankton bloom based on the following: • A diatom bloom occurred in 2003. There have been no reported blooms since that date. • The duration of the bloom, in 2003, was very short.
Details of proposed management measures	In the event that a phytoplankton blooms occurs Clare County Council will implement the following measures: • Identify and enumerate the bloom species • Ensure appropriate advice is provided to the public in a timely manner.

Part 7
Additional information

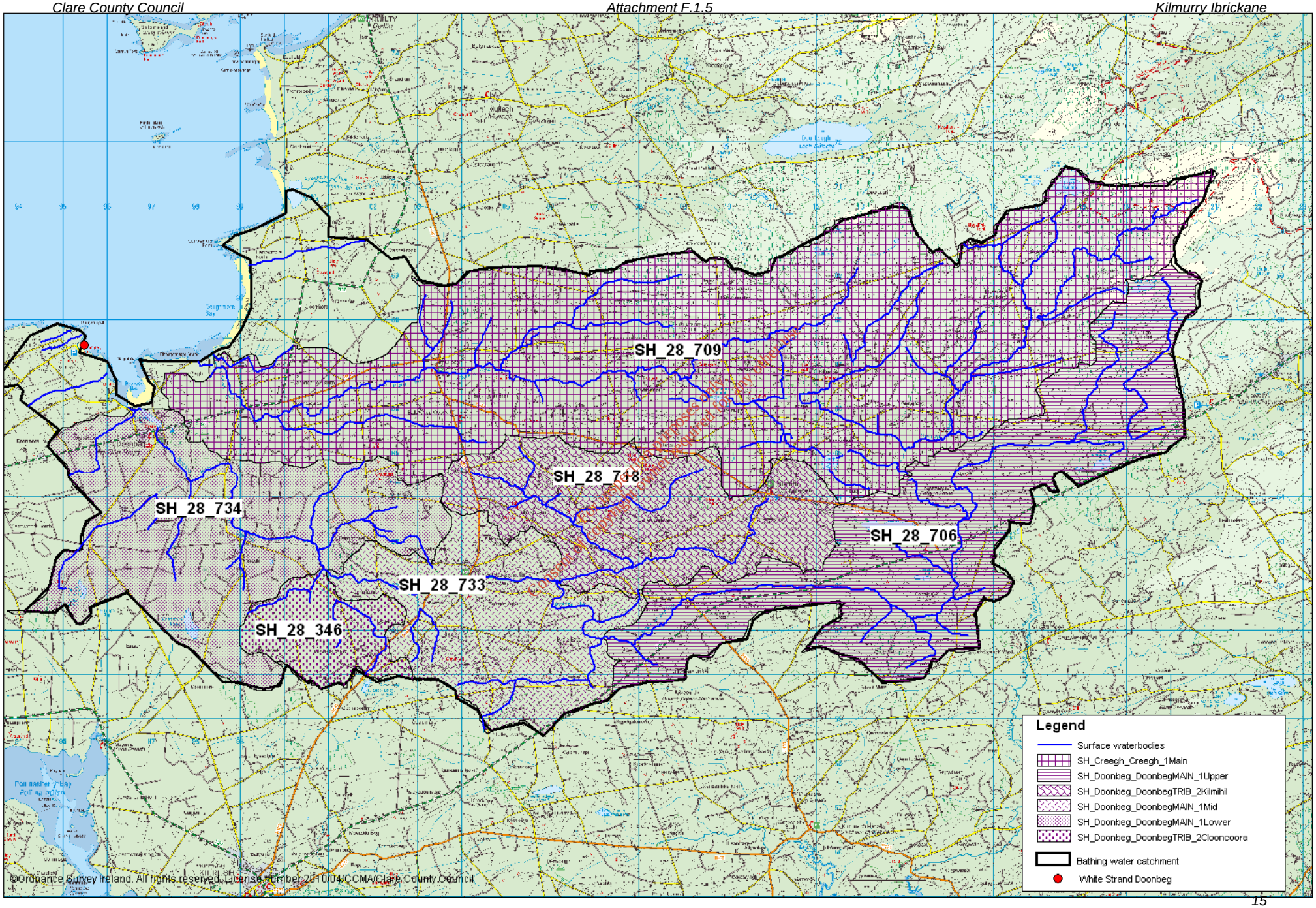
Information to be presented on notice board at designated bathing area

White Strand, Doonbeg is a sandy beach which faces to the northeast into Doonbeg Bay. This bathing area is part of the Mid Clare Coast SPA. The designated bathing area is 0.03km^2 approx in size and extends 230m along the shoreline of the White Strand beach. The sampling point is located below the lifeguard hut as indicated in Map 1.

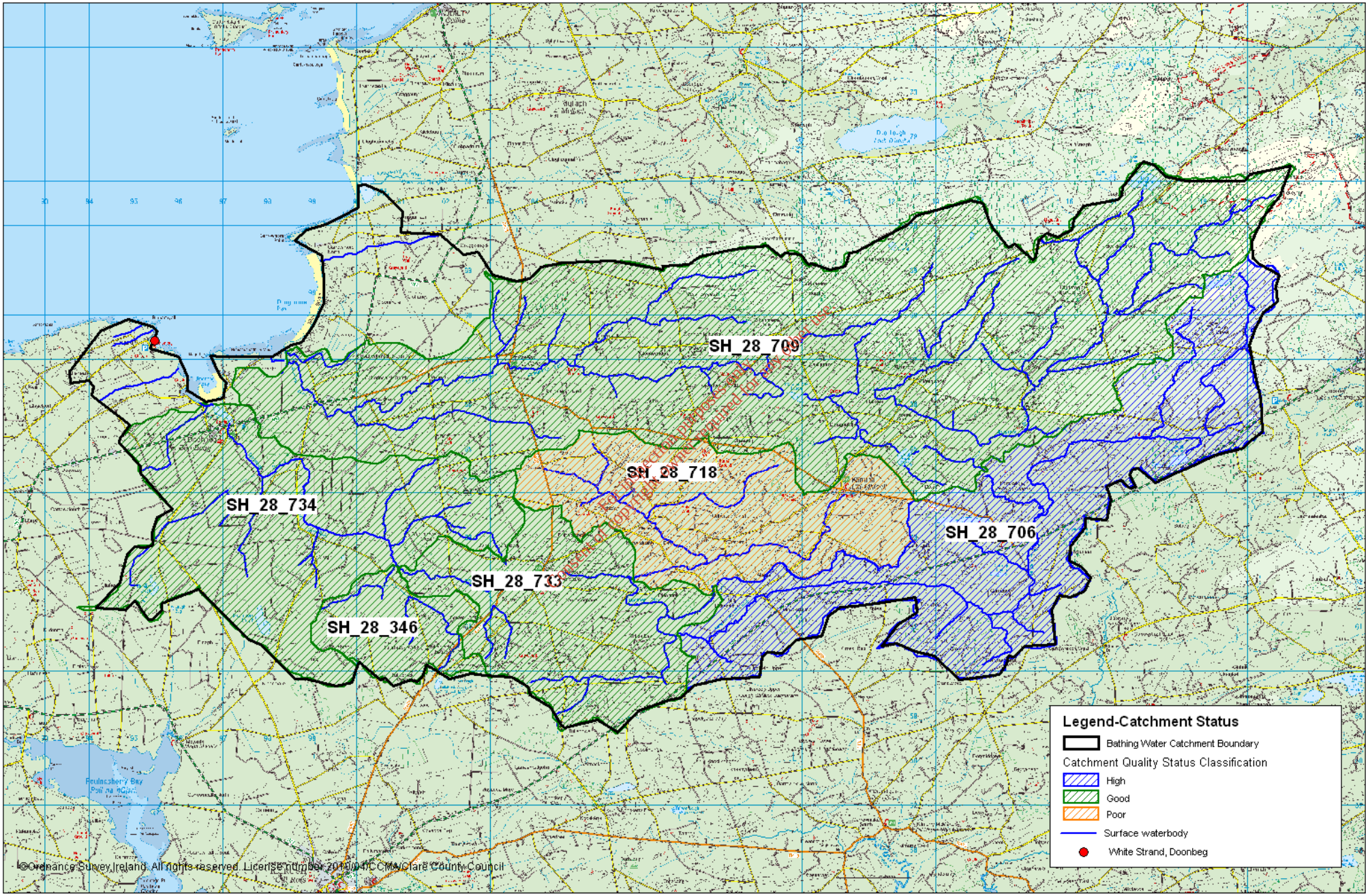
Clare County Council samples the bathing water during each Summer. Water quality test results, during the period 2000 – 2010, were in full compliance with the standards specified under the Quality of Bathing Water Regulations, 1992, and the Bathing Water Quality Directive 76/160/EEC.

There is a very low risk to water quality at White Strand. However, short term pollution events (<24hours) from point and diffuse pollution sources may occur and can be linked to heavy storm events. Although these rare pollution events may occur and impact on bathing water quality, Clare County Council will investigate and take all appropriate action including informing the public, should such an event happen.

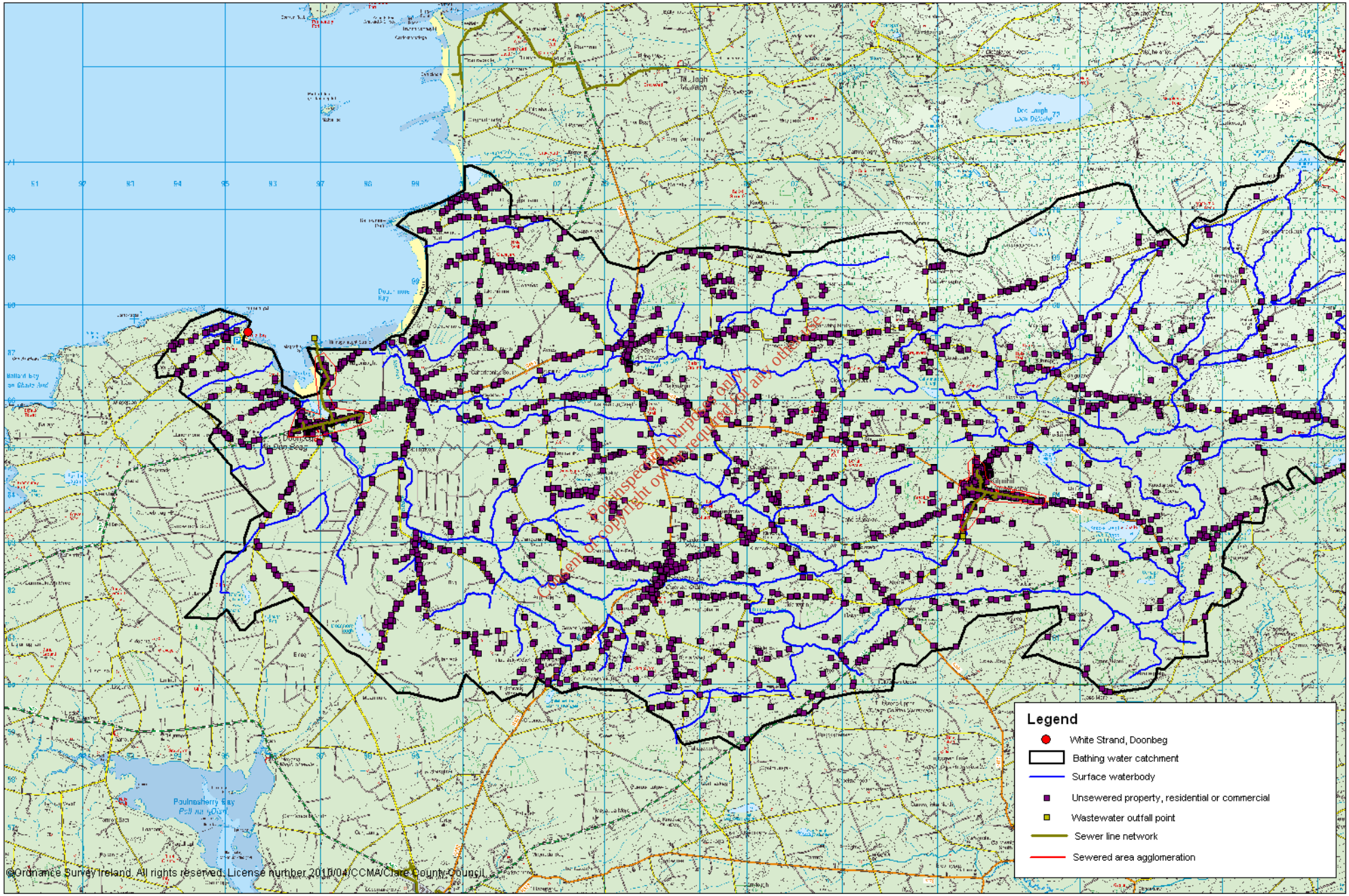
Map 2. Facilities at White Strand, Doonbeg



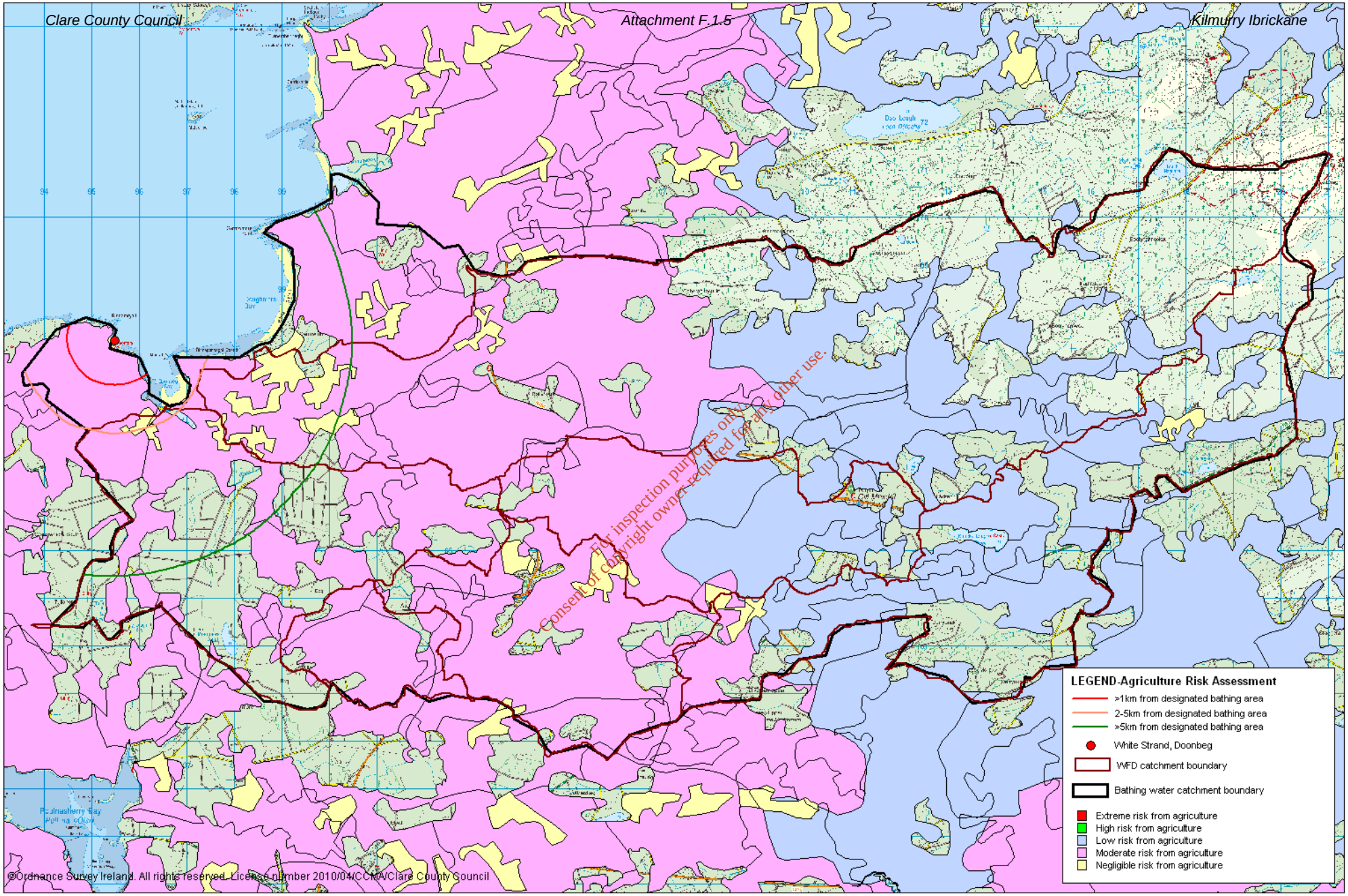
Map 3. Contributing catchments to Doonbeg Bay



Map 4. Contributing catchment status



Map 5. Potential pressure. Diffuse pollution from wastewater treatment plants and unsewered areas



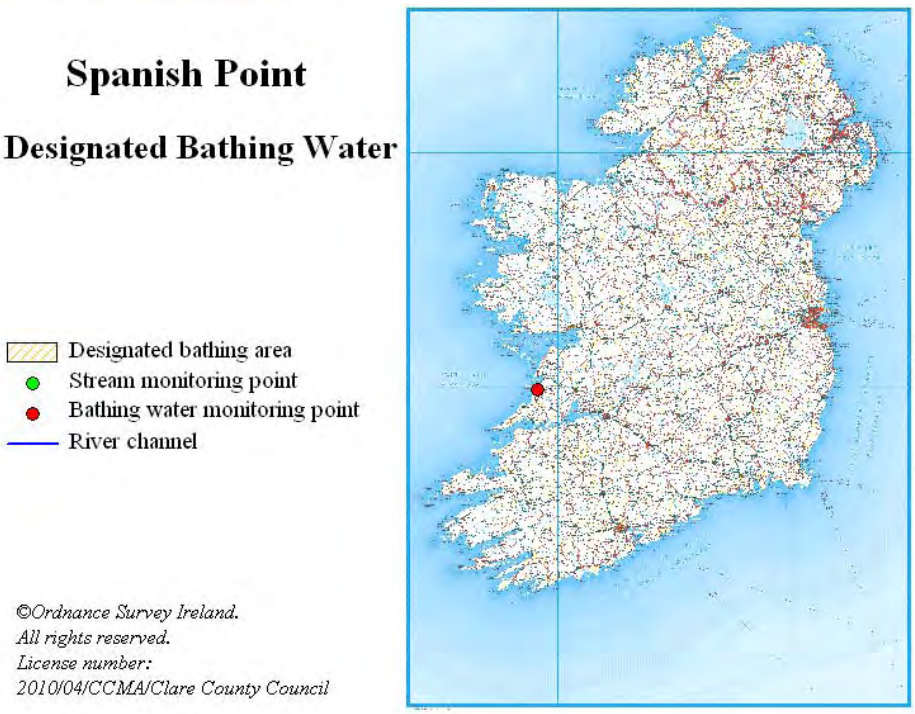
Map 6. Potential pressure-diffuse pollution from agriculture

Bathing Water Profile

Bathing area	Spanish Point
Bathing water ID	IESHBWC0070_0000_0300
Competent Authority	Clare County Council

Version number: 1.0	**Date:** February 2011	**Next review date:** 2015

Part 1
Description of the bathing water and it's contributing catchment



Map 1: Location and extension of bathing water including location of monitoring point

Description of the Bathing Water

Location and Extent
The bathing water at Spanish Point is located on the west coast of Clare as shown in Map 1. The designated bathing area is 36m^2 approx in size and extends 200m along the shoreline.

Name of River Basin District
Shannon River Basin District

Waterbody
Spanish Point is located at Mal Bay within the Shannon Plume (Waterbody Code SH_070_0000). A small stream, Spanish Point Stream enters the designated bathing area just south of the lifeguard hut. Approximately 0.5km north of the designated bathing area another unnamed stream discharges to the sea. This waterbody has not been assigned a code or status under the Water Framework Directive. Further south of the designated bathing area the Annagh river (Waterbody name and code: SH_Annagh_AnnaghMain_1Lower (SH_28_232) discharges to Mal Bay.

Main Features

Type of bathing water:
The bathing area at Spanish Point lies to the west of Milltown Malbay on the road from Quilty to Lahinch. It is an extensive stretch of sandy beach which forms a straight face onto the open Atlantic sea at Mal Bay.
Spanish Point shore can be divided into four zonation patterns. The Splash Zone which only gets wet from the splashing by waves, the Upper Zone which is only covered at high tide, the Middle Zone which is covered and uncovered for about the same length of time and the Lower Zone which is only uncovered at low tide.

Flora/Fauna /riparian zone
The sandy areas of the beach do not support many animals. This is due to the very exposed nature of the area to strong waves making it an inhospitable place for animals to live. However the long spine of rocks which stick out into the sea and the rocky shoreline at the northern end of the strand are very interesting places to observe a variety of plants and animals.
On the steep, almost vertical face of the reef, the zonation of different animals is clearly apparent with a white band of tiny barnacles occurring above the darker band of mussels. The white dogwhelk, which is a carnivorous snail and feeds on mussels, can be seen in the mussel band. Limpets, Red seaweed and Anemones are also present.
Birdlife in the area include the Redshank, Skylarks, Terns and Dippers.

Land use
Spanish Point beach lies on the outskirts of the small urban centre of Spanish Point village. The immediate vicinity of the designated bathing area is classified as discontinuous urban fabric, where land use predominantly consists of buildings, road networks and car parking facilities.
The town of Milltown Malbay is 2km approximately to the north-east of the bathing area. Otherwise the predominant land use outside the urban areas is agriculture.

Tidal Range
During the bathing season the tidal ranges vary between 2m and 5.2m.

Water Depth
The depth of water increases slowly and steadily westward towards the horizon.

Facilities and Activities

Facilities
Facilities and activities at Spanish Point comprise of the following:

- Designated Swimming Area
- Life ring
- Toilets
- Parking facilities
- Launching Slipway
- Picnic Area
- Litter Disposal
- Emergency Telephone
- Lifeguard Station
- Information Point
- First Aid
- Recycling Facilities
- Drinking Water

Visitor Numbers
Spanish Point village has a resident population of 200 and the busy urban centre of Milltown Malbay has a P.E. of 1300 approx. In summer visitor numbers can elevate this estimate to above 2000 persons. It is estimated that a maximum of 300 visitors can occur a day. However visitors to Spanish Point Bathing Area average 50 persons per day.

Activities
Bathing is the main activity at Spanish Point. Surfing is also very popular at this location.

Clare County Council introduced Beach byelaws in May 2008 under Part 19 Local Government Act, 2001, & Local Government Act, 2001 (Commencement) Order 2006. Under these bye-laws the following activities are prohibited:

- Horse riding (between 11am and 6pm)
- Dog walking (between 11am and 6pm)
- Any use of motorised watercraft
- Surfing in the vicinity of swimmers

Description of the contributing catchment

Contributing Catchment
The contributing catchment of the designated bathing area at Spanish Point is 50 km^2 in area. Refer to Map 2 attached.

Waterbodies in the contributing catchment
Table 1 lists the main waterbodies of the catchment, with quality status assigned in the Shannon River Basin Management Plan (July 2006)

Code	*Name*	*Current water quality Status*
SH_28_231	SH_Annagh-Glendine_1	Good
SH_28_232	SH_Annagh-Annagh Main_1L	Good
SH_28_241	SH_Annagh-Kildeema_1	Moderate
SH_28_242	SH_Annagh-Annagh-Main 2M	Poor
No Code	Spanish Point Stream	Status not Established
No Code	Stream north of Bathing area	Status not Established

Table 1:

- The Glendine River rises in the upland areas of Glendine North. From here it travels south-westwards for 7kn approx and is joined by three other tributaries.
- The Kildeema River rises in an upland area just north of Slieve Callan. It travels 7km south-westerly passing an area of forestry at Dunsallagh before it joins up with the Caherogan River at Dogherty Bridge.

- The River Annagh Rises at Slieve Callan and flows west for 3km where it joins with the Caheraran River. It then flows further westerly for 6km to where it converges with the Glendine River and the Kildeema River after which it flows to the sea 400m south of the designated bathing area.
- Spanish Point Stream is a first order stream that rises 1.5km in the direction of Milltown Malbay town. This stream discharges directly onto the designated bathing area. Monitoring by Clare County Council has found this stream to be bacteriologically unsatisfactory.
- There is another first order stream discharging to the sea 0.5km north of Spanish Point beach.

Landuse
The land use in the bathing water catchment is predominantly rural with agriculture as the major land use. Risk from agriculture is classed largely as moderate with a smaller area classed as negligible. In the upper reaches of the catchment there is transitional woodland scrub, combined with commercial forestry, and peat bogs. To the north of the catchment the town of Milltown Malbay (1300pe) is located. Approximately 75% of the sewered area of Milltown Malbay is located within the Spanish point bathing water catchment.

Topography
The catchment consists generally of gently sloping hills and valleys rising in the upper reaches of the catchment to a height of 391m at Slievecallan Mountain.

Soils, Subsoils and Bedrock
The soils vary but are comprised mostly of poorly draining gleys of the Kilrush Series with poorly draining peats (Aughty and Aughty Cutover Series) predominating in the upper reaches of the catchment. In the immediate vicinity of the designated bathing area free draining Regosols (Seafield Series) are present. Brown Earths (Tullig and Kilfergus Series) and Podzols (Knockanimpaha Series) also feature within the bathing water catchment. The predominant bedrock in the catchment is Sandstone, Siltstone and mudstone (Central Clare Group). The groundwater within the catchment is designated by the GSI as a Locally Important (LI) Aquifer, moderately productive in local zones, with high (H) and extreme ('E', 'X') groundwater vulnerability ratings.

Population centres
The main population centre in the catchment is Milltown Malbay (1300 p.e).

Areas of special interest
The SAC Carrowmore Point to Spanish Point and Islands (Site Code: 001021) extends along the Clare coastline from Spanish Point in a south-south westerly direction to Carrowmore Point (See Map 2). It comprises a strip of coastline, several offshore islands and rocks and the open marine water of Mal Bay between the islands and the mainland.
A priority habitat of petrifying springs occurs along the sea cliffs at the south end of Spanish Point beach.
Spanish Point also holds a very high number of littoral reef communities while at the low shore and sub tidal fringe up to 85 species have been recorded.

The Mid-Clare Coast SPA (Site Code: 004182) is a Special Protection Area under the E.U. Birds Directive. This site extends along the Co. Clare coastline in a south-south-westerly direction from Spanish Point to just west of Doonbeg Bay, a distance of some 14 km. The mainland shore is especially important for winter waders.

Rainfall

The following details area based on information obtained from the Irish Meteorological Services 1961 – 1990 data

This catchment experiences annual mean rainfall of 1000-1200mm.
At Shannon airport the highest average rainfall was in December (mean monthly total of 99mm) and the lowest was in April (mean monthly total of 55.7mm). The average yearly rainfall was 926.7 mm at Shannon Airport.
There is no rainfall station in this catchment.

Part 2
Details on the location of the monitoring point

Grid Reference for monitoring location (x,y)	103,362 177,722 (See Map 1)
Reason for selection of monitoring point	Location where most bathers swim due to its location below the lifeguard hut

Part 3
Qualitative assessment of water quality at the bathing site

As detailed in Table 2 below the bathing area in Spanish Point was compliant with mandatory values under the Quality of Bathing Water Regulations,1992, during the period 2003 –2010. During the period 2003 to 2010 the bathing water was in compliance with guideline values under the Bathing Water Quality Directive 76/160/EEC (Table 3). As a result Spanish Point bathing area was awarded a Blue Flag from An Taisce for each bathing season during the period 2003 – 2010.

Parameter	Mandatory values		% test results higher than mandatory value								Accepted % test results higher than mandatory values	
	No. per 100 mls											
Total Coliforms	5000	10,000	2003	2004	2005	2006	2007	2008	2009	2010	20 %	5 %
			0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %		
Faecal Coliforms	1000	2,000	0 %	0 %	0 %	0 %	0 %	0 %	0%	0 %	20 %	5 %
Faecal Streptococci	300		0 %	0 %	0 %	0 %	0 %	0 %	0%	0 %	5 %	
Compliant			**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Table 2: Bathing Water microbiological parameters tested at *Spanish Point Bathing area* and the mandatory quality standards achieved for the period 2003 to 2010 under the Quality of Bathing Water Regulations,1992

Parameter	Guideline values	% test results higher than guideline value								Accepted % test results higher than guideline value
Total Coliforms	500/100 ml	2003	2004	2005	2006	2007	2008	2009	2010	20 %
		0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
Faecal Coliforms	100/100 ml	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	20 %
Faecal Streptococci	100/100 ml	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	10 %
Compliant		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	

Table 3: Bathing Water microbiological parameters tested at *Spanish Point Bathing area* and the guideline quality standards achieved for the period 2003 to 2010 under the Bathing Water Quality Directive 76/160/EEC

A report by Mr. Bartholomew Masterson, UCD, on *Retrospective Compliance of Clare Designate Bathing Waters with the Irish SI 79 of 2008 during the period 2002 –2009* assigns a classification under the Bathing Water Directive of **excellent**, for the bathing area at Spanish Point, for the period 2006 -2009. For the same period 2006 –2009 Mr. Masterson has calculated an intestinal enterococci 95-percentile value of 48 for Spanish Point. This value equates to a Water Quality Impact Grade of **B**, which will be used in the Microbial Pollution Risk assessments in Part 4 of this BW Profile.

There has been no incidence of proliferation of macro algae and / or marine phytoplankton recorded during the period 2003 – 2010.

Part 4
Identification and risk assessment of potential pressures
(point and diffuse sources)

Description of potential pressures in the catchment assessed as posing no risk

1. Forestry

Description of pressure: There are several areas of forestry in the upper reaches of the catchment.

Description of risk assessment methodology and the results: There is no faecal contamination associated with forestry.

2. Waste Water Treatment Plants (WWTP)

Description of pressure:
Primary and secondary treatment of wastewater is provided.

Description of risk assessment methodology and the results
Table 4 details the type of risk assessment used and the results of the risk assessment carried out on the wastewater treatment system located within the catchment.

WWTP	Population size	Treatment	Discharge Type	Microbial Pollution Potential (WHO 2003)	WQI Grade	Microbial Pollution Risk (WHO 2003)
Milltown Malbay	Small	Secondary	Short Outfall	Low	B	Very Low

Table 4: Waste water treatment plant risk assessment

Risk of short-term pollution (nature frequency and duration)
As can be seen in table 6 the Microbial Pollution risk is Very Low. As this plant discharges into a stream that does not flow directly onto the bathing area it is considered that the risk of short term pollution is negligible.

Management measures taken/proposed to be taken including time scales
Regular maintenance and inspection of the wastewater treatment system should be undertaken, to ensure that it is operating satisfactorily and in compliance with conditions of their EPA Wastewater Licences /certificates. In the event of a breakdown or malfunction at the WWTP staff responsible for bathing waters shall be notified immediately.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

3. Licences issued under Section 4 of the Local Government (Water Pollution) Act 1977-1990.

Description of pressure: There are three licences issued under Section 4 of the Local Government (Water Pollution) Act 1977-1990 located within the catchment.

Description of risk assessment methodology and the results: Table 5 details the type of risk assessment used and the results of the risk assessment carried out on WP Licences located within the catchment. It is considered that there is minimal risk to water quality even in the event of a breakdown at one of these wastewater plants.

License	Population Size	River Flow	Sewage Treatment	Microbial Pollution Potential (Bartem and Rees, 2000)	WQI Grade	Microbial Pollution Risk (WHO 2003)
The Armada Hotel	Small	To Ground	Secondary	Very Low	B	**Very Low**
Spanish Point Homes	Small	To Ground	Secondary	Very Low	B	**Very Low**
Bellbridge House Hotel	Small	Large To Ground	Secondary Secondary	Very Low	B	**Very low**

Table 5: Microbial Pollution Risk Assesment for sewage discharges from WP Licences to waters

Description of potential pressures in the catchment assessed as posing a risk

1. Diffuse pollution from unsewered areas:

Description of pressure:
The closest sewered area is Milltown Malbay. The area of land in the immediate vicinity of the bathing area at Spanish Point is unsewered.

Description of risk assessment methodology and the results:
The risk associated with unsewered developments is considered to be very low. The immediate area surrounding the bathing area and the catchment as a whole is unsewered therefore there is a risk of diffuse pollution from unsewered areas. The population density is low/medium at 50-100 persons per square kilometer. The residential housing density is also low with a density of approximately 7 houses per square kilometer (Geodirectory 2009).
Unsewered dwellings largely discharge directly to ground following individual treatment.

The soils vary but are comprised mostly of poorly draining gleys and peats predominating in the upper reaches of the catchment. In the immediate vicinity of the designated bathing area, free draining Regosols are present. Therefore as a whole the catchment has poor drainage with variable poor percolation characteristics.

Spanish Point Stream discharges directly onto the designated bathing area. This stream runs adjacent to the main Milltown Malbay road. A survey was carried out in 2003 by the laboratory staff of Clare County Council. Any unsatisfactory treatment systems were addressed and improved. However analysis of Spanish Point Stream during the bathing water season shows that it is microbiologically unsatisfactory. This is probably due to the proximity of dwellings to the stream, giving rise to accelerated discharge to water in wet weather. Micro-biological results of the bathing water at Spanish Point have shown no deterioration in the period 2003-2010.

Risk of short-term pollution:
Overall within the catchment there is a very low risk from unsewered developments. However there is always an inherent risk that one or a number of wastewater treatment system/systems may malfunction or become overloaded simultaneously and result in some level poor quality discharge to receiving waters. Should this occur within the 1km buffer zone in combination with poor weather conditions the duration of short-term pollution would be very short. On-going monitoring of the stream is in place to identify short term spikes in bacterial loading.

Management measures taken/proposed to be taken including time scales:
Septic tank / percolation areas shall be adequately maintained and checked such that there is no risk of a foul discharge to waters including groundwater. In the event that a wastewater treatment system is deemed a risk to environment /public health enforcement action will be taken by Clare County Council under the Local Government (Water Pollution) Act 1977-2007 and / or Water Services Act 2007. Also the stream shall be monitored on an on-going basis. Should elevations in the bacteriological levels occur remedial action will be undertaken.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

2. Diffuse pollution from unsewered areas – Clare County Council public toilets

Description of pressure:
Public toilet facilities are provided by Clare County Council at Spanish Point. These facilities are served by a septic tank before percolating to ground. Refer to Map 3.

Description of risk assessment methodology and the results:

A Microbial Pollution Risk (MPR) of low was assigned taking the following factors into account:

- The on site wastewater treatment system is located in close proximity to the bathing area.
- Soils in the immediate vicinity of the designated bathing area where the Clare County Council public toilets are located are brown earths which have good draining and percolating characteristics.
- Clare County Council maintains the wastewater treatment system well and there has been no incident of pollution of waters.

Risk of short-term pollution (nature frequency and duration)
While the Microbial Pollution Risk has received a low risk grade, due to close proximity of the on site treatment system to the designated bathing area there is an inherent risk that a wastewater treatment system may malfunction and result in a poor quality discharge to receiving waters. In the unlikely event that this may occur the duration of short-term pollution would be very short.

Management measures taken/proposed to be taken including time scales
Septic tank / percolation areas shall be adequately maintained and checked such that there is no risk of a foul discharge to waters in including groundwater. In the event of a malfunction and /or a discharge of foul effluent from the septic tank / percolation area staff responsible for bathing waters shall be notified immediately.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

3. Diffuse agriculture pollution

Description of pressure:
The main land use within the catchment is agriculture. Farming is not very intensive and is comprised mainly of small dairy and /or beef farms and their associated spreadlands.

Description of risk assessment methodology and the results:
The Microbial Pollution Potential (MPP) grades for agriculture risk were calculated based on the distance from the bathing area and the agriculture risk associated with a particular area. Refer to Table 6. The agriculture risk is census data based on pressures from cattle and sheep (Department of Agriculture 2000), tillage (Department of Agriculture 2000), and pigs and poultry (Teagasc 2000). For the Water Framework Directive results have been applied to agriculture layers of the Corrine 2000 in Mapinfo.

	Agriculture risk			
Distance (km) from bathing Area	High Risk	Moderate Risk	Low Risk	Negligible Risk
<1	Very high	High	Mod	Low
1-2	High	Mod	Low	Very Low
2-5	Mod	Low	Very Low	Very Low

Table 6: Microbial Pollution Potential from diffuse agriculture sources (Clare County Council, 2010)

The Microbial Pollution Risk for a particular area within the bathing water catchment can then be graded, with reference to Map 3 attached. Refer to table 7 for examples.

Example Number	Agriculture Risk Type	Distance from bathing area	Microbial Pollution Potential	WQI Grade	Microbial Pollution Risk (WHO 2003)
1	Moderate	<1km	High	**B**	**Moderate**
2	Moderate	1-2km	Moderate	**B**	**Low**
3	Moderate	2-5km	Low	**B**	**Very Low**

Table: 7 Risk assessment for diffuse agriculture pollution

Risk of short-term pollution:
Overall within the catchment there is a low risk of diffuse pollution from agriculture. Farmers are permitted to spread slurry, and other farm effluents, on spreadlands located within the catchment throughout the bathing season. However during times of heavy rainfall there is a risk of runoff from slurry spreading to adjacent waters, which may have adverse effects on the water quality at the bathing area at Spanish Point.

Management measures taken/proposed to be taken including time scales:
Ensure that farmers are spreading slurry in accordance with the European Communities (Good Agriculture Practice for Protection of Waters) Regulations 2009. In this regard, it is not permitted to apply slurry to land within 48 hours of heavy rain being forecast. Enforcement notices will be issued to farmers who are not spreading slurry in accordance with European Communities (Good Agriculture Practice for Protection of Waters) Regulations 2009.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

Part 5
Risk assessment for cyanobacteria.

Risk assessment for the proliferation of cyanobacteria	Current information suggests that the bathing water is not at risk of a proliferation of cyanobacteria
Details of proposed management measures	None necessary

Part 6
Risk assessment for macro-algae and phytoplankton

Risk assessment for the proliferation of macro-algae and phytoplankton	Current information suggests that the bathing water is not at risk of a proliferation of macro-algae of phytoplankton
Details of proposed management measures	None necessary

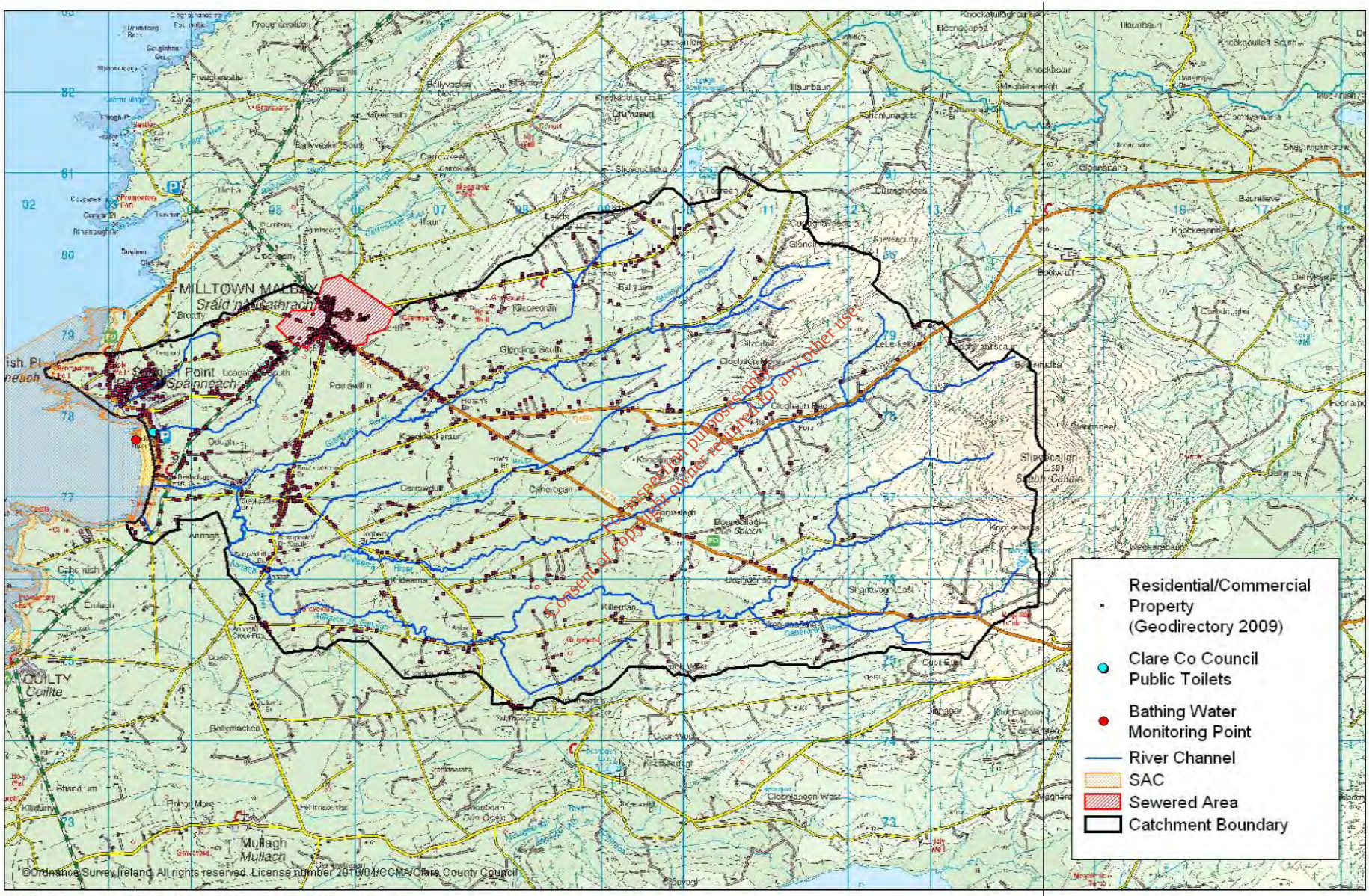
Part 7
Additional information

Information to be presented on notice board at Spanish Point designated bathing area

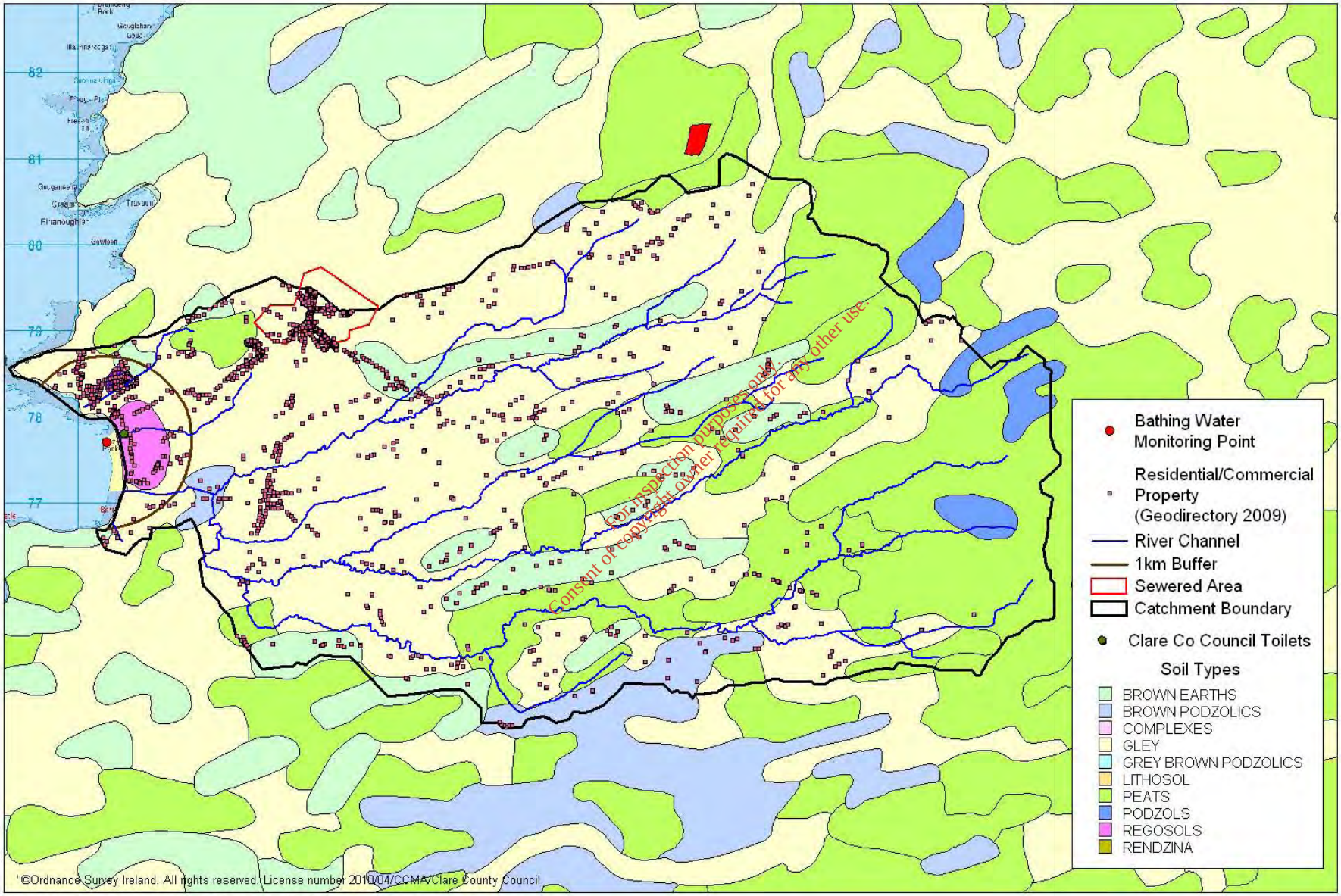
The bathing water at Spanish Point is located on the west coast of Clare as shown in Map 1. The designated bathing area is 36m^2 approx in size and extends 200m along the shoreline.
The bathing area at Spanish Point lies to the west of Milltown Malbay on the road from Quilty to Lahinch. It is an extensive stretch of sandy beach which forms a straight face onto the open Atlantic sea at Mal Bay.

Clare County Council samples the bathing water during each Summer. Water quality test results, during the period 2000 – 2010, were in full compliance with the standards specified under the Quality of Bathing Water Regulations, 1992, and the Bathing Water Quality Directive 76/160/EEC.

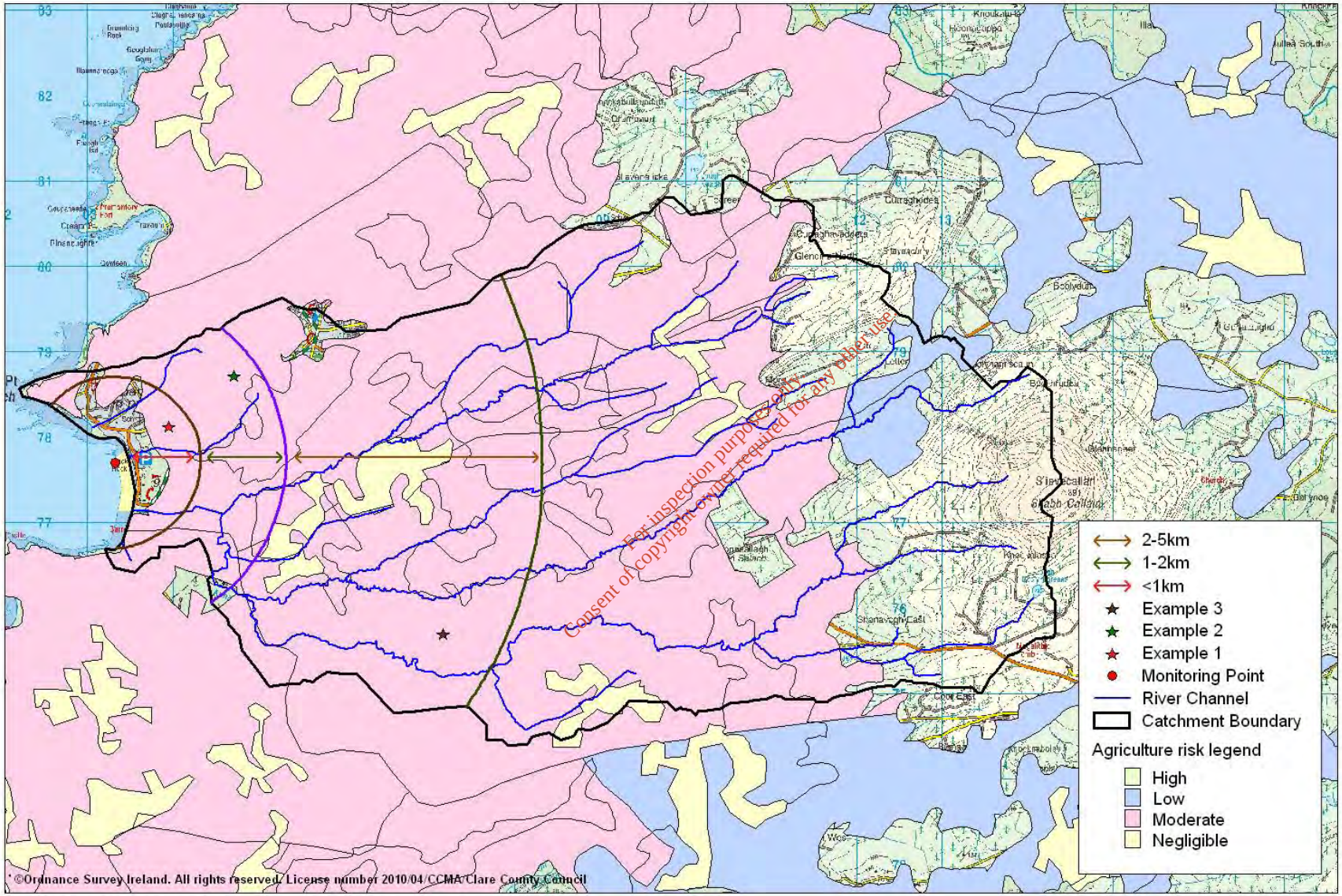
There is a very low risk to water quality at Spanish Point. However, short term pollution events (<24hours) from point and diffuse pollution sources may occur and can be linked to heavy storm events. Although these rare pollution events may occur and impact on bathing water quality, Clare County Council will investigate and take all appropriate action including informing the public, should such an event happen.



Map 2. Spanish Point Bathing Water Catchment



Map 3. Spanish Point - Diffuse pollution from unsewered areas

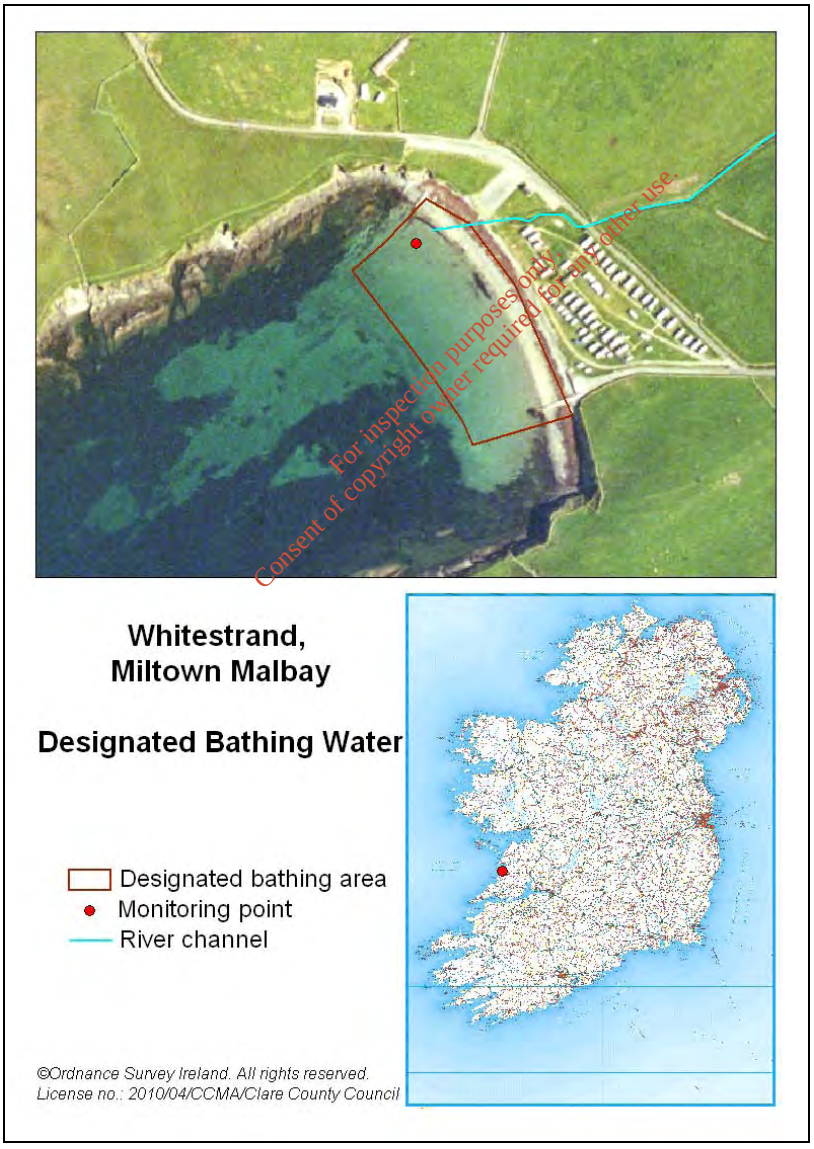


Map 4. Spanish Point - Risk assessment for diffuse agriculture

Bathing Water Profile

Bathing area	Whitestrand, Miltown Malbay
Bathing water ID	IESHBWC070_0000_0200
Competent Authority	Clare County Council

Version number: 1	**Date:** 24/03/11	**Next review date:** 24/03/15



Map 1: Location and extension of bathing water including location of monitoring point

Description of the Bathing Water

Location and Extent
White Strand beach is located in the west coast of Clare to the north of Spanish Point Beach and to the northwest of Miltown Malbay as detailed in Map 1. The designated bathing area is approx 0.02 km^2 in size and extends 230m along the shoreline

Name of River Basin District
Shannon River Basin District

Waterbody
Whitestrand beach is located within the Shannon Plume coastal waterbody (Code: SH_070_0000). A small stream known as the Ballyvaskin River enters the designated bathing area just south of the lifeguard hut. This waterbody has not been assigned a code or status under the Water Framework Directive. Further south of the designated bathing area at Whitestrand is the waterbody SH_Coastal_Carrowkeel_1 (Code: SH_28_410).

Main Features

Type of bathing water:
It is relatively small sandy beach at the end of a narrow rock flanked bay. Due to the presence of offshore reefs the force of wave action is greatly reduced once they reach the shoreline.

Flora/Fauna /Riparian zone
The marine riparian zone at Whitestrand Miltown Malbay is classified as heavily modified. Below the round stoned defence barrier the bathing area is sandy with the absence of vegetation associated with the upper, middle and lower beach zones. The rocky shores which flank either side of the beach demonstrate patterns of zonation. In the upper zone the brown channel wrack and small white barnacles mingled with spiral wrack occur. In the middle zone bladder wrack, limpets, mussels and winkles are present. At extreme low water, oarweed can be seen in the lower zone.

Land use
The beach at Whitestrand is located in a rural setting within the townland of Fintra. Just above the designated bathing area there is Caravan Park. Outside of this the predominant land use is agriculture.

Tidal Range
The tides can be greatly affected by prevailing wind and wave action off the coast. During windy periods and when there is an ocean swell tides can be higher than would be predicted. During the bathing season tidal ranges vary between 2m and 5.2m.

Water Depth
The depth of water increases slowly and steadily westward towards the horizon.

Facilities and Activities

Facilities
Facilities and activities at Whitestrand comprise of the following (Refer to Map 2):

- Lifeguard hut and life rings
- Toilets
- Parking facilities
- Picnic Area
- Litter bins
- Emergency Telephone available at lifeguard hut
- Information notice board
- First aid
- Recycling facilities

Visitor Numbers
Adjacent to the beach is a caravan park which houses up to 40 caravans. The beach is also popular with locals and other holidaymakers. During good weather there can be up to a maximum of 400 people at this small and sheltered beach. The number of visitors per day during the bathing season is estimated at 50 persons.

Activities
The predominant activity at Whitestrand is swimming. The beach is also utilised by walkers who continue their walk along the headland towards Whitestrand, Miltown Malbay.

Clare County Council introduced Beach byelaws in May 2008 under Part 19 Local Government Act, 2001, & Local Government Act, 2001 (Commencement) Order 2006. Under these bye-laws the following activities are prohibited:

- Horse riding (between 11am and 6pm)
- Dog walking (between 11am and 6pm)
- Any use of motorised watercraft
- Surfing in the vicinity of swimmers

Description of the contributing catchment

Whitestrand, Miltown Malbay Bathing area is located in the west coast of Co. Clare, north of Spanish Point, in the Shannon River Basin District.

Contributing Catchment
The contributing catchment of the designated bathing area at the Whitestrand Miltown Malbay is 14 km^2 in area. Refer to Map 3 attached.

Waterbodies draining to the bathing area
Table 1 lists the waterbodies that make up the contributing catchment. The Ballvaskin River discharges directly onto the designated bathing area at Whitestrand Miltown Malbay before discharging in to Travaun Bay. It is considered that the Carrowkeel river catchment, which discharges south of Travaun Bay, may also impact on quality at the designated bathing area at Whitestrand, Miltown Malbay.

WFD Code	*Name*	*Current water quality status*
None assigned	Ballyvaskin River	Non assigned
SH_28_410	Carrowkeel River (Coastal)	Moderate

Table 1: List of the waterbodies in the contributing catchment as assigned under the Water Framework Directive

The Ballyvaskin River rises in the townland of Ballyvaskin South north east of Travaun Bay. It travels a distance of 2.5km through agriculture pastures before discharging to the sea at Whitestrand. The Ballyvaskin River has not been assigned a water quality status under the Shannon River Basin Management Plan (2010).

The Carrowkeel Catchment consists of two waterbodies, the Carrowkeel River and the Cloonbony River. Both these converge 250m u/s Cloonbony Bridge before discharging to the sea a further 1.5 km downstream.

The Carrowkeel River rises in Knockabullaundull and travels 8km through predominantly agriculture land to the mouth of the river. The Cloonbony river rises in Toor Hill where it travels 4.5km, again through predominantly agriculture farmland, before converging with the Carrowkeel river just u/s Cloonbony Bridge. Under the Shannon River Basin Management Plan (2010) Carrowkeel catchment has been assigned a water quality status of moderate. Moderate status in this catchment has been attributed to septic tanks and dispersed farms.

Landuse
The land use in the bathing water catchment is predominantly rural with agriculture as the major land use. Risk from agriculture is classed largely as moderate (85% of the catchment area) with a smaller area (5%)

classed as negligible. In the upper reaches of the catchment there is transitional woodland scrub and peat bogs. The southeast of the catchment includes part of the sewered urban area of Miltown Malbay. This equates to 25% of the wider urban rural town of Miltown Malbay (1300 pie.) and <1% of the total bathing water catchment area.

Topography
The catchment consists generally of gently sloping hills and valleys rising in the upper reaches of the catchment to a height of 200m.

Soils, Subsoils and Bedrock
The soils vary but are comprised mostly of poorly draining gleys (Kilrush Series and to a lesser extent Abbeyfeale Non Peaty Series) and well drained Brown Earths (Kilfergus Series). Smaller areas of peats (Aughty and Aughty cutover series) and Brown Podzolics (Mountcollins Series) also feature intermittently. The predominant bedrock in the catchment is Sandstone, Siltstone and mudstone (Central Clare Group). Immediately north of the designated bathing area at Whitestrand, Miltown Malbay there is a pocket of Mudstone siltstone & sandstone (Shannon Group).
The groundwater within the catchment is designated by the GSI as a Locally Important (LI) Aquifer, moderately productive in local zones, with high (H) and extreme ('E', 'X') groundwater vulnerability ratings.

Population centres
The main population centre of Miltown Malbay (1300pe) is in the south east of the catchment. 25% of this wide urban area is located within the bathing water catchment. The wastewater treatment plant and the outfall from the wastewater treatment plant are located outside the bathing water catchment.

Areas of special interest
There are no designated areas of special interest within this bathing water catchment

Rainfall

The following details area based on information obtained from the Irish Meteorological Services 1961 – 1990 data:

- There is a mean annual rainfall of 1000-1400mm within the catchment.
- At Shannon Airport, over the period 1961 – 1990, the highest average monthly rainfall was in December (mean monthly total of 99mm) and the lowest average monthly rainfall is in April (mean monthly total of 55.7mm). The average yearly rainfall, during the period 1961-1990, was 926.7 mm at Shannon Airport.
- There is no rainfall station located within the bathing water catchment. The closest rainfall station to the designated bathing area at Whitestrand, Miltown Malbay is at Quilty.

Part 2
Details on the location of the monitoring point

Grid Reference for monitoring location (x,y)	103 824; 180 627 (See Map 1)
Reason for selection of monitoring point	Location where most bathers swim due to its location below the lifeguard hut and below the point where the Ballyvaskin River discharges to the sea

Part 3
Qualitative assessment of water quality at the bathing site

As detailed in Table 2 bathing water quality standards at Whitestrand, Miltown Malbay were compliant with both the Quality of Bathing Water Regulations, 1992, (Table 2) and Bathing Water Quality Directive 76/160/EEC (Table 3) during the period 2003 to 2010. As a result the bathing area at was awarded a Blue Flag from An Taisce for each bathing season during the period 2003 – 2009.

Parameter	Mandatory values (No. per 100 mls)		% test results higher than mandatory value								Accepted % test results higher than mandatory values	
			2003	2004	2005	2006	2007	2008	2009	2010		
Total Coliforms	5000	10,000	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	20 %	5 %
Faecal Coliforms	1000	2,000	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	20 %	5 %
Faecal Streptococci	300		0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	5 %	
Compliant			**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**		

Table 2: Bathing Water microbiological parameters tested at *Whitestrand, Miltown Malbay Bathing area* and the mandatory quality standards achieved for the period 2003 to 2010 under the Quality of Bathing Water Regulations,1992

Parameter	Guideline values	% test results higher than guideline value								Accepted % test results higher than guideline value
		2003	2004	2005	2006	2007	2008	2009	2010	
Total Coliforms	500/100 ml	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	20 %
Faecal Coliforms	100/100 ml	8%	0 %	0 %	0 %	0 %	0 %	0 %	10 %	20 %
Faecal Streptococci	100/100 ml	0 %	0 %	0 %	0 %	0 %	0 %	0%	10 %	10 %
Compliant		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	

Table 3: Bathing Water microbiological parameters tested at *Whitestrand, Miltown Malbay Bathing area* and the guideline quality standards achieved for the period 2003 to 2010 under the Bathing Water Quality Directive 76/160/EEC

Table 4, overleaf, summarises exceedances of guideline values. Exceedances were recorded in 2003 and 2010. The exceedance in 2003 was attributed to poor weather conditions. During the period 2004 to 2009 there was full compliance with guideline limits. However an exceedance of guideline limits was recorded in 2010 indicating that the beach at Whitestrand, Miltown Malbay, is subject to short term pollution.

A report by Mr. Bartholomew Masterson, UCD, on *Retrospective Compliance of Clare Designate Bathing Waters with the Irish SI 79 of 2008 during the period 2002 –2009* assigns a classification under the Bathing Water Directive of **excellent**, for the bathing area at Whitestrand, Miltown Malbay, for the period 2006 -2009. For the same period 2006 –2009 Mr. Masterson has calculated an intestinal enterococci 95-percentile value of 45 for Whitestrand, Miltown Malbay. This value equates to a Water Quality Impact Grade of **B**, which will be used in the Microbial Pollution Risk assessments in Part 4 of this BW Profile.

While seaweed does wash onto the designated bathing area from the rocky shorelines, which flank either side of the beach, there has been no incidence of proliferation of macro algae and / or marine phytoplankton recorded during the period 2003 –2010.

Year	No. of samples taken	No. samples in exceedance of physico chemical parameters	No. of samples in exceedance of microbiological parameters	Date of exceedance/s	Parameters in exceedance	Explanation for exceedance
2003	13	0	1	10/06/03	Faecal Coliforms	Poor weather conditions
2004	12	0	0	n/a	n/a	n/a
2005	14	0	0	n/a	n/a	n/a
2006	13	0	0	n/a	n/a	n/a
2007	13	0	0	n/a	n/a	n/a
2008	12	0	0	n/a	n/a	n/a
2009	10	0	0	n/a	n/a	n/a
2010	10	0	1	09/08/10	Faecal Coliforms Faecal Streptococci	Unknown

Table 4: Summary of exceedances of physico chemical and microbiological parameters during the period 200

Part 4
Identification and risk assessment of potential pressures (point and diffuse sources)

Description of potential pressures in the catchment assessed as posing no risk

1. Quarries:

Description of pressure: In the upper reaches of the catchment there is quarry in the townland of Slievenalicka. On the fringes of the upper catchment at Toor Hill another small quarry encroaches into the bathing water catchment area.

Description of risk assessment methodology and the results: There is no faecal contamination associated with mining.

Description of potential pressures in the catchment assessed as posing a risk

1. Diffuse agriculture pollution

Description of pressure:
The main land use within the catchment is agriculture. Farming is not very intensive and is comprised mainly of small dairy and /or beef farms and their associated spreadlands.

Description of risk assessment methodology and the results:
The Microbial Pollution Potential (MPP) grades for agriculture risk were calculated based on the distance from the bathing area and the agriculture risk associated with a particular area. Refer to Table 5. The agriculture risk is census data based on pressures from cattle and sheep (Department of Agriculture 2000), tillage (Department of Agriculture 2000), and pigs and poultry (Teagasc 2000). For the Water Framework Directive results have been applied to agriculture layers of the Corrine 2000 in Mapinfo.

	Agriculture risk			
Distance (km) from bathing Area	High Risk	Moderate Risk	Low Risk	Negligible Risk
<1	Very high	High	Mod	Low
1-2	High	Mod	Low	Very Low
2-5	Mod	Low	Very Low	Very Low
>5	Low	Very Low	Very Low	Very Low

Table 5: Microbial Pollution Potential from diffuse agriculture sources (Clare County Council, 2010)

The Microbial Pollution Risk for a particular area within the bathing water catchment can then be graded, with reference to Map 4 attached. Refer to table 6 for examples.

Example Number	Agriculture Risk Type	Distance from bathing area	Microbial Pollution Potential	WQI Grade	Microbial Pollution Risk (WHO 2003)
1	Moderate	<1km	High	**B**	**Moderate**
2	Moderate	1-2km	Moderate	**B**	**Low**
3	Moderate	2-5km	Low	**B**	**Low**
4	Moderate	>5 km	Very low	**B**	**Very low**

Table: 6 Risk assessment for diffuse agriculture pollution

Risk of short-term pollution (nature frequency and duration):
Overall within the catchment there is a low risk of diffuse pollution from agriculture. However diffuse pollution from slurry spreading in close proximity to the bathing area is considered a moderate pollution

risk taking into account the poor draining soils located within the 1km buffer zone. Farmers are permitted to spread slurry, and other farm effluents, on spreadlands located within the catchment throughout the bathing season. However during times of heavy rainfall there is a risk of runoff from slurry spreading to adjacent waters, which may result in poor quality bathing water. In the event that there is diffuse pollution from agriculture the duration of short-term pollution would be very short.

Management measures taken/proposed to be taken including time scales:
Ensure that farmers are spreading slurry in accordance with the European Communities (Good Agriculture Practice for Protection of Waters) Regulations 2010. In this regard, it is not permitted to apply slurry to land within 48 hours of heavy rain being forecast. Enforcement notices will be issued to farmers who are not spreading slurry in accordance with European Communities (Good Agriculture Practice for Protection of Waters) Regulations 2010.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

2. Diffuse pollution from unsewered areas – Clare County Council public toilets

Description of pressure:
Public toilet facilities are provided by Clare County Council at Whitestrand, Miltown Malbay. These facilities are served by a septic tank before percolating to ground. Refer to Map 5.

Description of risk assessment methodology and the results:

A Microbial Pollution Risk (MPR) of low was assigned based on taking the following factors into account:

- The on site wastewater treatment system is located in close proximity to the bathing area and the Ballvaskin river, which discharges to the designated bathing area at Whitestrand Miltown Malbay. The system discharges to groundwater via a percolation area.
- Soils in the immediate vicinity of the designated bathing area where the Clare County Council public toilets are located are brown earths which have good draining and percolating characteristics.
- Clare County Council maintains the wastewater treatment system well and there has been no incident of pollution of waters.

Risk of short-term pollution (nature frequency and duration)
While a low risk grade has been assigned and the loading to the system is very low, there is an inherent risk that the treatment system may malfunction and result in a poor quality discharge to receiving waters. In the unlikely event that this may occur the duration of short-term pollution would be very short.

Management measures taken/proposed to be taken including time scales
Septic tank / percolation areas shall be adequately maintained and checked such that there is no risk of a foul discharge to waters including groundwater. In the event of a malfunction and /or a discharge of foul effluent from the septic tank / percolation area staff responsible for bathing waters shall be notified immediately.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

3. Diffuse pollution from unsewered areas – Caravan Park

Description of pressure:
There is a caravan park located in the immediate vicinity of the bathing area at Miltown Malbay. The caravan park can cater for 40 caravans. Wastewater from the caravan park is discharged to a septic tank before percolating to ground. Refer to Map 5.
Soils in this vicinity are brown earths which have good draining and percolating characteristics

Description of risk assessment methodology and the results:
A Microbial Pollution Risk (MPR) of low was assigned taking the following factors into account:

- The on site wastewater treatment system is located in close proximity to the bathing area and the Ballvaskin river. However the discharge from the system is to groundwater.
- Soils in the immediate vicinity of the designated bathing area where the Caravan park toilets are located are brown earths which have good draining and percolating characteristics.
- The wastewater treatment system serving the Caravan Park is well maintained and there has been no incident of pollution of waters.
- The caravan units tend to be used for short-term visits rather than long-stay visits.

Risk of short-term pollution (nature frequency and duration):
While a low risk grade has been assigned there is an inherent risk that the treatment system may malfunction and result in a poor quality discharge to receiving waters. In the unlikely event that this may occur the duration of short-term pollution would be very short.

Management measures taken/proposed to be taken including time scales:
Septic tank / percolation areas shall be adequately maintained and checked such that there is no risk of a foul discharge to waters, including groundwater. In the event that a wastewater treatment system is deemed a risk to the environment and /or public health appropriate enforcement action will be taken by Clare County Council under the Local Government (Water Pollution) Act 1977-2007 and / or Water Services Act 2007.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

4. Diffuse pollution from unsewered areas – privately owned residential houses

Description of pressure:
The catchment as a whole is largely unsewered. 25% of the wide urban area of Miltown Malbay is located within the bathing water catchment. The remainder of the catchment is unsewered which equates to a low residential housing density of approx 7 houses per km^2 (Geodirectory 2009). Refer to Map 5.

Description of risk assessment methodology and the results:
The soils vary but are comprised mostly of poorly draining gleys (Kilrush Series and to a lesser extent Abbeyfeale Non Peaty Series) and well drained Brown Earths (Kilfergus Series). Due to the low density of housing within the bathing water catchment, as detailed in Map 5 attached, the microbial pollution risk from unsewered areas is considered low.

Risk of short-term pollution (nature frequency and duration):
While the Microbial Pollution Risk has received a low risk grade due to close proximity of unsewered residential housing to the designated bathing area and the presence of poorly draining gley soils there is an inherent risk that during times of heavy rainfall there may be diffuse discharges to receiving waters. In the unlikely event that this may occur the duration of short-term pollution would be very short.

Management measures taken/proposed to be taken including time scales:
Privately owned on site wastewater treatment systems shall be adequately maintained and checked such that there is no risk of a foul discharge to waters including groundwater. Where wastewater treatment systems are deemed a risk to the environment and /or public health appropriate enforcement action will be taken by Clare County Council under the Local Government (Water Pollution) Act 1977-2007 and / or Water Services Act 2007.

Contact details of bodies responsible for taking such action:
Environment and Water Services Directorate, Clare County Council. Tel: 065 68 4621616.

Part 5
Risk assessment for cyanobacteria.

Risk assessment for the proliferation of cyanobacteria	Current information suggests that the bathing water is not at risk of a proliferation of cyanobacteria
Details of proposed management measures	None necessary

Part 6
Risk assessment for macro-algae and phytoplankton

Risk assessment for the proliferation of macro-algae and phytoplankton	Current information suggests that the bathing water is not at risk of a proliferation of macro-algae of phytoplankton
Details of proposed management measures	None necessary

Part 7
Additional information

The following information is to be displayed on the notice board at Whitestrand, Miltown Malbay:

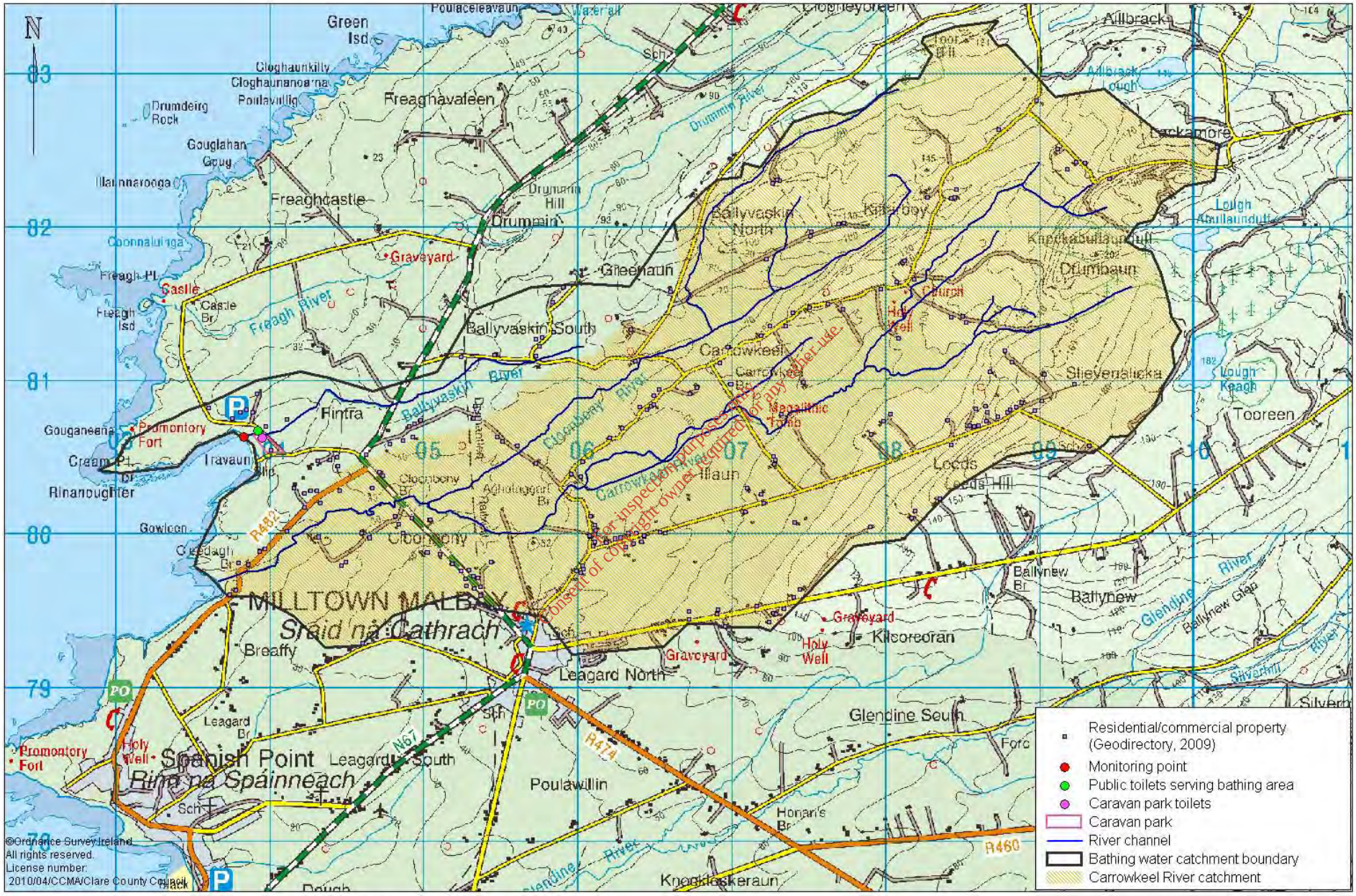
White Strand beach is located in the west coast of Clare to the north of Spanish Point Beach and to the northwest of Miltown Malbay

The designated bathing area is approx 0.02m^2 in size and extends 230m along the shoreline. It is relatively small sandy beach at the end of a narrow rock flanked bay. Due to the presence of offshore reefs the force of wave action is greatly reduced once they reach the shoreline. The beach slopes gently towards the water. A small stream runs to the north of the beach. The sampling point is located at the point below which the stream enters the bathing area as indicated in Map 2.

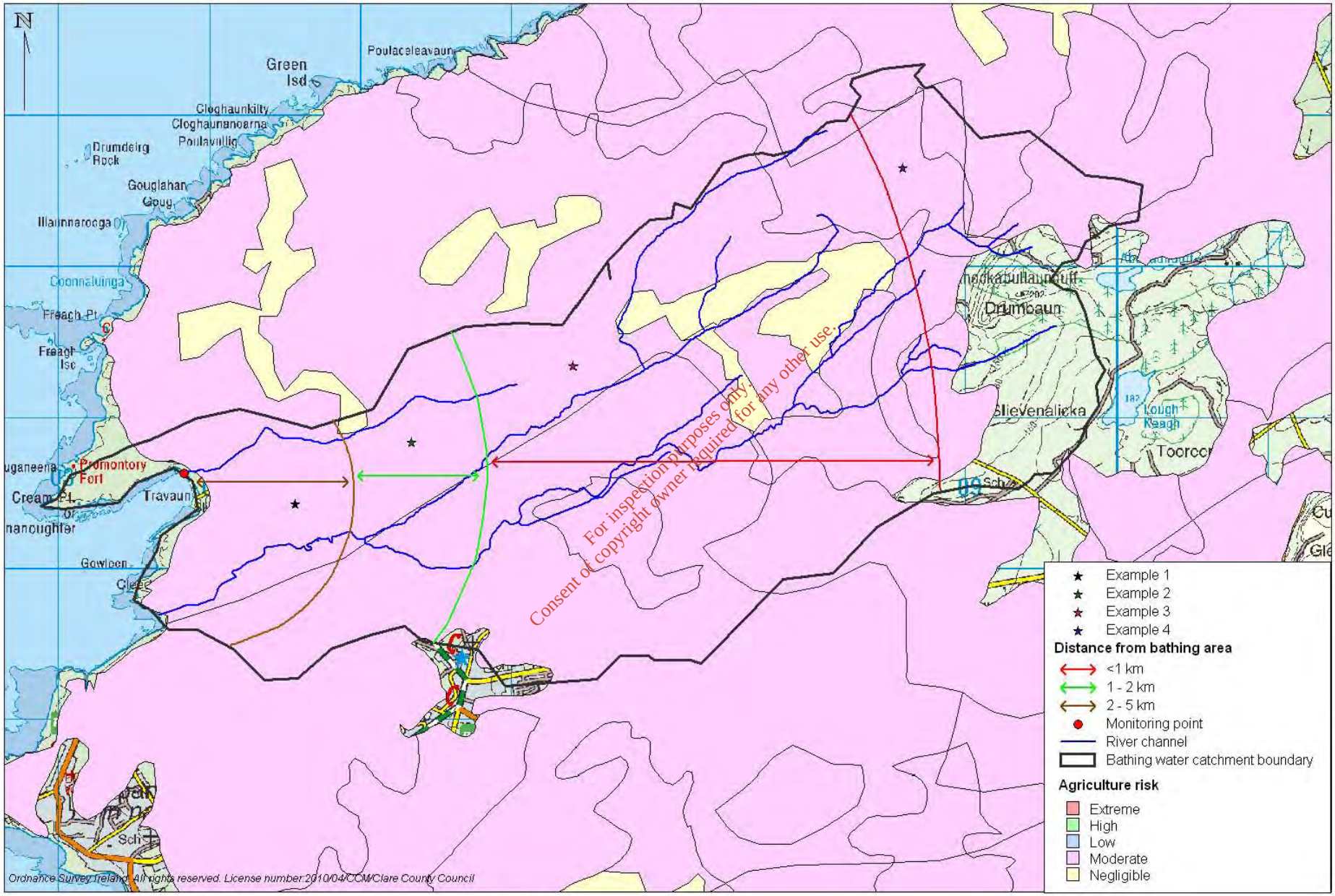
Clare County Council samples the bathing water during each Summer. Water quality test results, during the period 2003 – 2010, were in compliance with the Quality of Bathing Water Regulations, 1992, and the Bathing Water Quality Directive 76/160/EEC.

There is a very low risk to water quality at Whitestrand Miltown Malbay. However, short term pollution events (<24hours) from point and diffuse pollution sources may occur and can be linked to heavy storm events. Although these rare pollution events may occur and impact on bathing water quality, Clare County Council will investigate and take all appropriate action including informing the public, should such an event happen

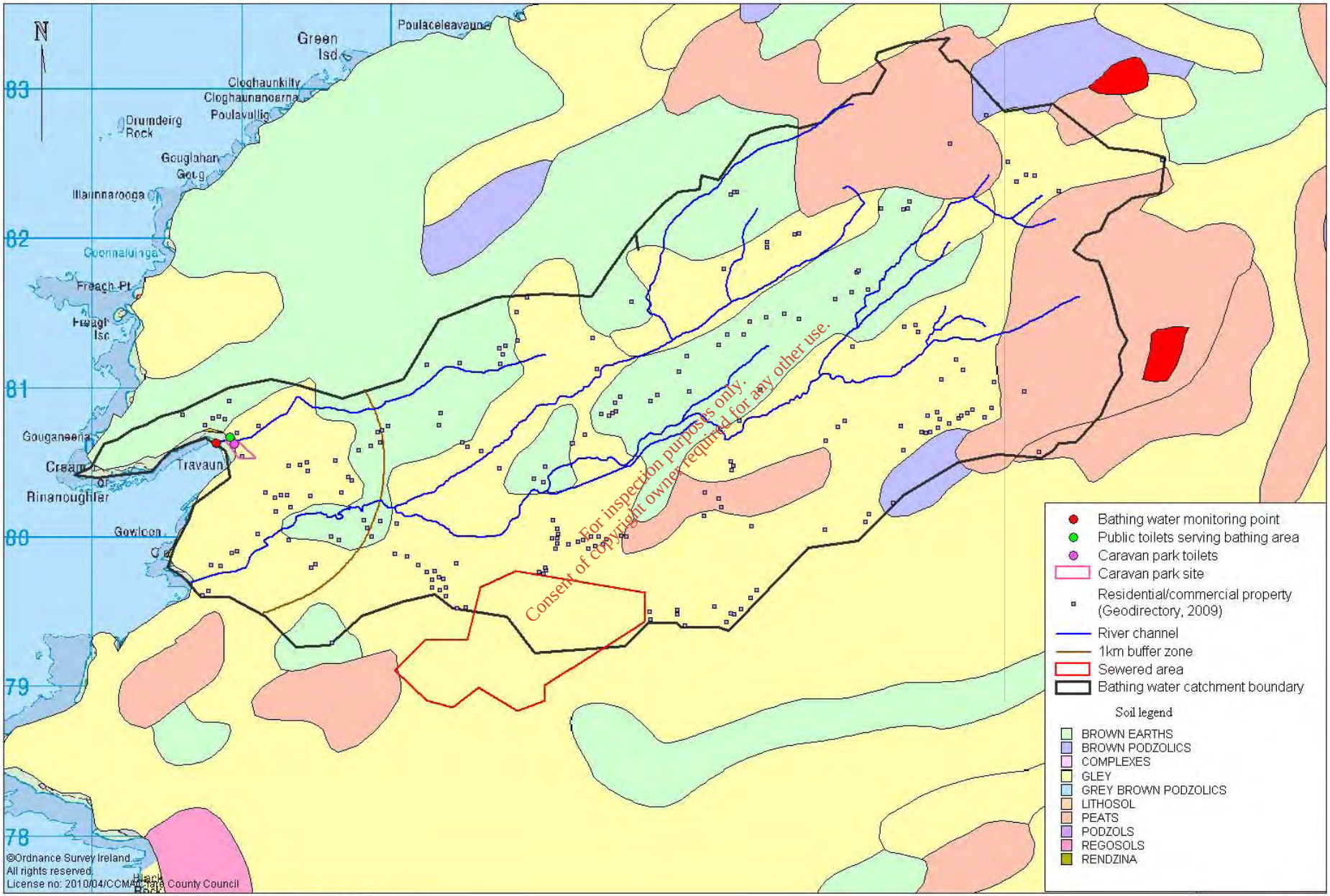
Map 2: Blue flag beach map



Map 3: Whitestrand, Miltown Malbay, Bathing Water Catchment



Map 4: Risk assessment for diffuse agriculture pollution



MAP 5: Diffuse pollution from unsewered areas

THIS APPLICATION HAS NOT BEEN SUBMITTED

Agglomeration details

Leading Local Authority	Clare County Council
Co-Applicants	
Agglomeration	Kilmurry Ibrickane
Population Equivalent	1109
Level of Treatment	Secondary
Treatment plant address	Tromracastle Quilty Co. Clare
Grid Ref (12 digits, 6E, 6N)	100381 / 173369 (Verifed using GPS)
EPA Reference No:	

Contact details

Contact Name:	Sean Ward Senior Engineer
Contact Address:	Clare County Council Environment and Water Services Directorate Áras Contae an Chláir New Road, Ennis, Co. Clare.
Contact Number:	353 65 21616
Contact Fax:	353 65 21915
Contact Email:	sward@clarecoco.ie

Table D.1(i)(a): EMISSIONS TO SURFACE/GROUND WATERS (Primary Discharge Point)

Discharge Point Code: SW-1

Local Authority Ref No:	Clare	
Source of Emission:	WWTP	
Location:	Tromracastle Quilty	
Grid Ref (12 digits, 6E, 6N)	100590 / 174540 (Verifed using GPS)	
Name of Receiving waters:	Shannon Plume	
Water Body:	Coastal Water Body	
River Basin District	Shannon IRBD	
Designation of Receiving Waters:	SAC; SPA	
Flow Rate in Receiving Waters:	0	$m^3.sec^{-1}$ Dry Weather Flow
	0	$m^3.sec^{-1}$ 95% Weather Flow
Additional Comments (e.g. commentary on zero flow or other information deemed of value)	SAC Code:001021; SPA Code:004182; Discharge is to a coastal water, hence no flow data available for receiving water. Wastewater discharge calculations based flow data for first six month operating period of WWTP.	

Emission Details:

(i) Volume emitted			
Normal/day	110 m^3	Maximum/day	311 m^3
Maximum rate/hour	155.5 m^3	Period of emission (avg)	5 min/hr 2 hr/day 365 day/yr
Dry Weather Flow	0 m^3/sec		

Table D.1(i)(b): EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

Discharge Point Code: SW-1

Substance	As discharged			
	Unit of Measurement	Sampling Method	Max Daily Avg.	kg/day
pH	pH	24 hr composite	= 7.5	
Temperature	°C	24 hr composite	= 16.9	
Electrical Conductivity (@ 25°C)	µS/cm	24 hr composite	= 523	
Suspended Solids	mg/l	24 hr composite	= 2	
Ammonia (as N)	mg/l	24 hr composite	= 10	
Biochemical Oxygen Demand	mg/l	24 hr composite	< 2	
Chemical Oxygen Demand	mg/l	24 hr composite	= 63	
Total Nitrogen (as N)	mg/l	24 hr composite	= 13	
Nitrite (as N)	mg/l	24 hr composite	= 0.061	
Nitrate (as N)	mg/l	24 hr composite	= 1.29	
Total Phosphorous (as P)	mg/l	24 hr composite	= 2.04	
OrthoPhosphate (as P)	mg/l	24 hr composite	= 0.937	
Sulphate (SO_4)	mg/l	24 hr composite	= 48.5	
Phenols (Sum)	µg/l	24 hr composite	< 0.5	

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent

Table D.1(i)(c): DANGEROUS SUBSTANCE EMISSIONS TO SURFACE/GROUND WATERS - Characteristics of The Emission (Primary Discharge Point)

Discharge Point Code: SW-1

Substance	As discharged			
	Unit of Measurement	Sampling Method	Max Daily Avg.	kg/day
Atrazine	µg/l	24 hr composite	< 0.04	
Dichloromethane	µg/l	24 hr composite	< 1	
Simazine	µg/l	24 hr composite	< 0.04	
Toluene	µg/l	24 hr composite	< 1	
Tributyltin	µg/l	24 hr composite	< 0.1	
Xylenes	µg/l	24 hr composite	< 1	
Arsenic	µg/l	24 hr composite	< 0.5	
Chromium	µg/l	24 hr composite	< 0.5	
Copper	µg/l	24 hr composite	= 2	
Cyanide	µg/l	24 hr composite	< 10	
Flouride	µg/l	24 hr composite	= 400	
Lead	µg/l			
Nickel	µg/l	24 hr composite	< 0.5	
Zinc	µg/l	24 hr composite	< 5	
Boron	µg/l	24 hr composite	= 17	
Cadmium	µg/l	24 hr composite	< 0.5	
Mercury	µg/l	24 hr composite	< 0.1	
Selenium	µg/l	24 hr composite	< 0.5	
Barium	µg/l	24 hr composite	= 15	

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

TABLE E.1(i): WASTE WATER FREQUENCY AND QUANTITY OF DISCHARGE – Primary and Secondary Discharge Points

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)
SW-1	365	40150

TABLE E.1(ii): WASTE WATER FREQUENCY AND QUANTITY OF DISCHARGE – Storm Water Overflows

Identification Code for Discharge point	Frequency of discharge (days/annum)	Quantity of Waste Water Discharged (m^3/annum)	Complies with Definition of Storm Water Overflow

TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1a
Grid Ref (12 digits, 6E, 6N)	100456 / 174828

Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	21/05/20						
pH	= 8.2				Grab		Electrometry/CLS 26
Temperature	= 13.9				Grab		Thermometry
Electrical Conductivity (@ 25°C)	= 49.2				Grab		Electrometry/CLS 67
Suspended Solids	< 2				Grab		Filtration & Drying/CLS 13
Ammonia (as N)	= 0.014				Grab		JP Riley & K Grasshoff (ref Koroleff & Solorzano)
Biochemical Oxygen Demand	< 1				Grab		Electrometry/CLS 12
Chemical Oxygen Demand	= 80				Grab		CLS 52
Dissolved Oxygen					Grab		
Hardness (as $CaCO_3$)					Grab		
Total Nitrogen (as N)	< 0.5				Grab		Calculation/CLS 152
Nitrite (as N)	< 0.005				Grab		Konelab CLS 37
Nitrate (as N)	< 0.1				Grab		Konelab CLS 39
Total Phosphorous (as P)	< 0.05				Grab		Digestion/Colorimetry/CLS 151
OrthoPhosphate (as P)	= 0.021				Grab		Konelab CLS 35
Sulphate (SO_4)					Grab		Konelab CLS 88
Phenols (Sum)	< 1				Grab		SBD 29

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper
For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	

THIS APPLICATION HAS NOT BEEN SUBMITTED

TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)

Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1a
Grid Ref (12 digits, 6E, 6N)	100456 / 174828

Parameter	Results (µg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	21/05/20						
Atrazine	< 0.04				Grab		GCMS
Dichloromethane	< 1				Grab		GCMS
Simazine	< 0.04				Grab		GCMS
Toluene	< 1				Grab		GCMS
Tributyltin	< 0.02				Grab		GC
Xylenes	< 1				Grab		GCMS
Arsenic	= 6				Grab		ICP-MS
Chromium	= 4				Grab		ICP-MS
Copper	< 1				Grab		ICP-MS
Cyanide	< 9				Grab		Colorimetric
Flouride	= 100				Grab		ISE
Lead							
Nickel	= 2				Grab		ICP-MS
Zinc	< 5				Grab		ICP-MS
Boron	= 3769				Grab		ICP-MS
Cadmium	< 0.5				Grab		ICP-MS
Mercury	< 0.1				Grab		Atomic Fluorescence
Selenium	= 4				Grab		ICP-MS
Barium	= 10				Grab		ICP-MS

Additional Comments:	

Annex 2: Check List For Regulation 16 Compliance

Regulation 16 of the waste water discharge (Authorisation) Regulations 2007 (S.I. No. 684 of 2007) sets out the information which must, in all cases, accompany a discharge licence application. In order to ensure that the application fully complies with the legal requirements of regulation 16 of the 2007 Regulations, all applicants should complete the following.

In each case, refer to the attachment number(s), of your application which contains(s) the information requested in the appropiate sub-article.

Regulation 16(1) **In the case of an application for a waste water discharge licence, the application shall -**		**Attachment Number**	**Checked by Applicant**
(a)	give the name, address, telefax number (if any) and telephone number of the applicant (and, if different, of the operator of any treatment plant concerned) and the address to which correspondence relating to the application should be sent and, if the operator is a body corporate, the address of its registered office or principal office,	Application Form Section B	Yes
(b)	give the name of the water services authority in whose functional area the relevant waste water discharge takes place or is to take place, if different from that of the applicant,	Application Form Section B	Yes
(c)	give the location or postal address (including where appropriate, the name of the townland or townlands) and the National Grid reference of the location of the waste water treatment plant and/or the waste water discharge point or points to which the application relates,	Application Form Section B	Yes
(d)	state the population equivalent of the agglomeration to which the application relates,	Application Form Section B & Attachment B.9(i)	Yes
(e)	specify the content and extent of the waste water discharge, the level of treatment provided, if any, and the flow and type of discharge,	C.1	Yes
(f)	give details of the receiving water body, including its protected area status, if any, and details of any sensitive areas or protected areas or both in the vicinity of the discharge point or points likely to be affected by the discharge concerned, and for discharges to ground provide details of groundwater protection schemes in place for the receiving water body and all associated hydrogeological and geological assessments related to the receiving water environment in the vicinity of the discharge.	Attachment F.1	Yes
(g)	identify monitoring and sampling points and indicate proposed arrangements for the monitoring of discharges and, if Regulation 17 does not apply, provide details of the likely environmental consequences of any such discharges,	Attachments B.1, D.2, E.3	Yes
(h)	in the case of an existing waste water treatment plant, specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application,	E.4	Yes
(i)	describe the existing or proposed measures, including emergency procedures, to prevent unintended waste water discharges and to minimise the impact on the environment of any such discharges,	C.1	Yes
(j)	give particulars of the nearest downstream drinking water abstraction point or points to the discharge point or points,	Not Applicable	Yes
(k)	give details, and an assessment of the effects, of any existing or proposed emissions on the environment, including any environmental medium other than those into which the emissions are, or are to be made, and of proposed measures to prevent or eliminate or, where that is not practicable, to limit any pollution caused in such discharges,	F.1, F.1a, F.1.2	Yes
(l)	give detail of compliance with relevant monitoring requirements and treatment standards contained in any applicable Council Directives of Regulations,	F.1	Yes
(m)	give details of any work necessary to meet relevant effluent discharge standards and a timeframe and schedule for such work.	Not Applicable	Yes
(n)	Any other information as may be stipulated by the Agency.	Not Applicable	Yes
Regulation 16(3) **Without prejudice to Regulation 16 (1) and (2), an application for a licence shall be accompanied by -**		**Attachment Number**	**Checked by Applicant**
(a)	a copy of the notice of intention to make an application given pursuant to Regulation 9,	B.8	Yes
(b)	where appropriate, a copy of the notice given to a relevant water services authority under Regulation 13,	Not Applicable	Yes
(c)	Such other particulars, drawings, maps, reports and supporting documentation as are necessary to identify and describe, as appropriate -	B.1, B.2	Yes
(c) (i)	the point or points, including storm water overflows, from which a discharge or discharges take place or are to take place, and	B.1, C.1	Yes
(c) (ii)	the point or points at which monitoring and sampling are undertaken or are to be undertaken,	B.1	Yes

THIS APPLICATION HAS NOT BEEN SUBMITTED

Regulation 16(3) **Without prejudice to Regulation 16 (1) and (2), an application for a licence shall be accompanied by -**		**Attachment Number**	**Checked by Applicant**
(d)	such fee as is appropriate having regard to the provisions of Regulations 38 and 39.	B.9(iii)	Yes
Regulation 16(4) **An original application shall be accompanied by 2 copies of it and of all accompanying documents and particulars as required under Regulation 16(3) in hardcopy or in an electronic or other format as specified by the Agency.**		**Attachment Number**	**Checked by Applicant**
1	An Original Application shall be accompanied by 2 copies of it and of all accompanying documents and particulars as required under regulation 16(3) in hardcopy or in electronic or other format as specified by the agancy.	Application	Yes
Regulation 16(5) **For the purpose of paragraph (4), all or part of the 2 copies of the said application and associated documents and particulars may, with the agreement of the Agency, be submitted in an electronic or other format specified by the Agency.**		**Attachment Number**	**Checked by Applicant**
1	Signed original.	Application original copy	Yes
2	2 hardcopies of application provided or 2 CD versions of application (PDF files) provided.	Attached	Yes
3	1 CD of geo-referenced digital files provided.	Attached	Yes
Regulation 17 **Where a treatment plant associated with the relevant waste water works is or has been subject to the European Communities (Environmental Impact Assessment) Regulations 1989 to 2001, in addition to compliance with the requirements of Regulation 16, an application in respect of the relevant discharge shall be accompanied by a copy of an environmental impact statement and approval in accordance with the Act of 2000 in respect of the said development and may be submitted in an electronic or other format specified by the Agency**		**Attachment Number**	**Checked by Applicant**
1	EIA provided if applicable	Not Applicable	Yes
2	2 hardcopies of EIS provided if applicable.	Not Applicable	Yes
3	2 CD versions of EIS, as PDF files, provided.	Not Applicable	Yes
Regulation 24 **In the case of an application for a waste water discharge certificate of authorisation, the application shall –**		**Attachment Number**	**Checked by Applicant**
(a)	give the name, address, telefax number (if any) and telephone number of the applicant and the address to which correspondence relating to the application should be sent and, if the operator of the waste water works is a body corporate, the address of its registered office or principal office	Not Applicable	Yes
(b)	give the name of the water services authority in whose functional area the relevant waste water discharge takes place or is to take place, if different from that of the applicant,	Not Applicable	Yes
(c)	give the location or postal address (including where appropriate, the name of the townland or townlands) and the National Grid reference of the location of the discharge point or points to which the application relates,	Not Applicable	Yes
(d)	state the population equivalent of the agglomeration to which the application relates,		No
(e)	in the case of an application for the review of a certificate, specify the reference number given to the relevant certificate in the register,		No
(f)	specify the content and extent of the waste water discharge, the level of treatment provided and the flow and type of discharge,		No
(g)	give details of the receiving water body, its protected area status, if any, and details of any sensitive areas or protected areas, or both, in the vicinity of the discharge point or points or likely to be affected by the discharge concerned,		No
(h)	identify monitoring and sampling points and indicate proposed arrangements for the monitoring of discharges and of the likely environmental consequences of any such discharges,		No
(i)	in the case of an existing discharge, specify the sampling data pertaining to the discharge based on the samples taken in the 12 months preceding the making of the application,		No
(j)	describe the existing or proposed measures, including emergency procedures, to prevent unauthorised or unexpected waste water discharges and to minimise the impact on the environment of any such discharges,		No
(k)	give particulars of the location of the nearest downstream drinking water abstraction point or points to the discharge point or points associated with the waste water works,		No
(l)	give details of any designation under any Council Directive or Regulations that apply in relation to the receiving waters,		No
(m)	give details of compliance with any applicable monitoring requirements and treatment standards,		No
(n)	give details of any work necessary to meet relevant effluent discharge standards and a timeframe and schedule for such work,		No
(o)	give any other information as may be stipulated by the Agency, and		No
(p)	be accompanied by such fee as is appropriate having regard to the provisions of Regulations 38 and 39.		No