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CORK COUNTY COUNCIL

DUNGOURNEY WASTEWATER TREATMENT PLANT

Design Review Report

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1.0 INTRODUCTION

1.1 Background

Cork County Council has appointed White Young Green Ireland Ltd (WYG) to;

- prepare a Public Private Partnership contract with a Service Provider for the Design Build and operation of a proposed new wastewater treatment plant in Dungourney;
- prepare the detailed design and contract documents for the collection systems via fixed price contracts.

1.2 Brief

The scope of the brief includes:

- A review of the all existing relevant reports and production of a Design Review Report including estimated costs;
- Preparation of monthly/quarterly basis cash flows and review of same on ongoing basis for the duration of the contract;
- Preparation of Pricing Policy Reports;
- Preparation of Public Private Partnership Assessment Report;
- Identification and preparation of all land acquisition, compulsory purchase orders and wayleave maps;
- Provision of necessary drawings and documentation for Part 8 Planning;
- Arrange for site investigation work at the proposed WWTP and collection system, if required;
- Contract Document production;
- Administer the tendering process for the procurement of a Contractor for the WWTP and for the collection system;
- Administer the construction of the Works;
- Prepare the final account;
- Prepare progress reports as required;
- Act as Project Supervisor Design Process in accordance with the Safety, Health & Welfare at Work Construction Regulations 2006.

This report describes the existing scheme and sets out the basis for the design for the proposed works taking into account;

- estimated level of development in Dungourney and environs;
- the assimilative capacity of the receiving waters for the treated effluent;
- options for treatment and the level of treatment required;
- optimum location for the water treatment plant;
- indicative drawings of the proposed treatment plant;
- indicative drawings of the proposed collection system.



2.0 DESCRIPTION OF DUNGOURNEY

2.1 Location

Dungourney is a village located 10 kilometres northeast of Midleton, on the R627. Refer to **Figure 2.1** in **Appendix A** for details. The village is situated in a picturesque area overlooking the Dungourney and Kilha River valleys. The village services comprise;

- Church;
- Primary school;
- Shop/ post office;
- GAA grounds;
- Mechanics garage;
- Workshop/garage.

There are approximately 28 residential dwellings within the current development boundary as shown in the Midleton Electoral Area Local Area Plan. Refer to **Figure 2.2** in **Appendix A** for details of the extent of the Dungourney development boundary.

2.2 Development Plan

Dungourney is designated as a "Village" within East Cork in the overall strategy of the Midleton Electoral Area Local Area Plan (September 2005). The strategic aims for the village are to promote residential development in tandem with the provision of services.

Land zoned for residential development in the Midleton Electoral Area Local Area Plan (MEADLAP) is shown in **Figure 2.2** in **Appendix A**. The zoned areas as set out in MEADLAP and its adopted amendments are described below.

Objective No.	Specific Objective	Approx Area (Ha)
R-01	Low-density residential development.	2.4
R-02	Medium density residential development to include a mix of house types and sizes and a crèche.	2.6
R-03	Low-density residential development to include the retention of mature trees and hedgerows along the eastern boundary	4.5
O-01	Retain existing pitches	0.8
O-02	Lands to remain predominantly open and rural in character, with limited potential for individual dwellings	1.0
O-03	Lands to remain predominantly open and rural in character, protecting existing mature trees, with limited potential for individual dwellings	1.1



Objective No.	Specific Objective	Approx Area (Ha)
O-04	Lands to remain predominantly open and rural in character. Limited potential for individual dwellings at very low density, subject to a single agreed landscaping scheme with detailed provision for retaining and strengthening of hedgerows and on-site features. Active public open space should be provided on the portion of land across the road to the northeast and southeast of the site, along the river, as part of any overall development scheme on the land. A design brief for individual dwellings should be part of the scheme along with a high quality informal layout of sites with safe pedestrian access and served generally by a single entrance from the public road.	7.3

2.3 Previous Reports

As part of the design review process all existing relevant reports were reviewed. This is detailed further in Section 11.0.

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3.0 EXISTING SCHEME

3.1 Existing Treatment Facilities

Dungourney village is currently served by a combined foul and storm network and a septic tank that outfalls to the Dungourney River adjacent to Dungourney Bridge. Refer to **Figure 3.1** in **Appendix A** for details. The septic tank provides preliminary treatment only; reducing Biological Oxygen Demand (BOD) by approximately 20-30%. It also has little effect in reducing the number of coliforms in the water.

There are no details available on the construction method or the internal layout of the existing septic tank. It is assumed however that it comprises reinforced/insitu concrete. Although there is no information on the size of the septic tank it is reported to be overloaded.



Photograph 3.1 View of general area of location of the existing septic tank

3.2 Existing Collection System

A CCTV survey was carried out over the extent of the existing network. The structural condition of the sewers surveyed as part of the CCTV survey were visually assessed and graded depending on their internal condition in accordance with the Sewerage Rehabilitation Manual (SRM). The sewer defects were graded 1 to 5 as set out in **Table 3.1** below:



Table 3.1– Sewer Internal Condition Grades*	
Grade	Description
1	Acceptable Structural Condition
2	Minimal collapse risk in the short term but potential for further deterioration
3	Collapse unlikely in the near future but further deterioration likely
4	Collapse likely in the foreseeable future
5	Collapsed or collapse imminent.
* Source – Sewerage Rehabilitation Manual (SRM)	

The grade for the entire sewer length is based on the highest internal grade along that sewer length. Normally, sewers graded 4 or 5 will be targeted for upgrading immediately. It should be noted that, with modern trench less technology, it is now possible to upgrade only the affected section of sewer.

The CCTV survey of the existing sewerage collection system in Dungourney 7 manholes in the collection system. The length recorded amounts to 302.3m. However some of the sections surveyed had to be abandoned due to intrusions so the true length as well as the number of manholes is likely to be more than recorded.

Of the details recorded 52% of the network comprises pre-cast concrete; 38% comprises vitrified clay; 7% PVC and 3% cast iron. The sizing of the sewers are categorised as follows;

- 5% of the sewers are 100mm in diameter;
- 95% of the sewers are 225mm in diameter;

The CCTV survey identifies that half (50%) of the extent of the existing network surveyed is in poor condition and will need to be replaced/ upgraded as part of this scheme. The section identified as MH 7to MH10 inclusive, comprising a 225mm diameter pre-cast concrete sewer, is in good condition and should be retained.



4.0 EXISTING FLOWS AND LOADS

4.1 Existing Population

The existing catchment area is taken as area within the development boundary shown in the Middleton Electoral Area Local Area Plan. WYG estimates that the existing scheme serves approximately 28 domestic residences and 6 non-domestic customers.

The non-domestic customers are identified as:

- Church;
- Shop/post office;
- Primary School;
- Pub;
- Car mechanic's garage;
- Garage/workshop.

The current population equivalent served by the existing scheme is approximately 150 PE, say as shown in Table 4.1 below.

Table 4.1 Existing Population Equivalent

Users	PE
Domestic	84
Non Domestic	60
Total	144

Based on an estimated current total PE of 150, the flow and load in Dungourney are shown in Table 4.2 below.

Table 4.2 Existing Flow and Load

Description	Total
PE	150
Flow	27 m ³ /day
Load	9 kg/day



5.0 DESIGN FLOWS AND LOADS

5.1 Future Population

The future population has been estimated based on the areas zoned for development in Dungourney as described in Section 2.2 above and summarised in Table 5.1 below. Future house occupancy rates have been assumed to be the same as the current occupancy rates of 3 people per house.

Table 5.1 - Estimated Future Additional Population

Reference	Area (ha)	Specific Objective	Housing Density (nr / ha)	Houses	Pop.
R-01	2.4	Low Density Residential	12	29	86
R-02	2.6	Medium Density Residential	20	52	156
R-03	4.5	Low Density Residential	12	54	162
O-02	1.0	Limited potential for individual dwellings	5	5	15
O-03	1.1	Limited potential for individual dwellings	5	6	17
O-04	7.3	Limited potential for individual dwellings	5	37	110
Total =				182	545

The estimated future additional population is 545. This gives a total future population of 629 when combined with the existing population of 84 and is equivalent to an annual average increase of 10.6% when calculated over 20 years. Although high, this is not an unreasonable estimated increase when considering the low existing population and current level of development and current development pressures in east Cork.

The existing and future population figures stated above, together with the existing non-domestic wastewater load and a provision of 16% of the future domestic population of r future non-domestic load would give a future wastewater load of 782PE.

The future population was also assessed using the following;

- Growth rates from the 2003 Cork County Development Plan;
- Historical population trends;
- The CSO Population and Labour Force Projections 2006-2036;
- Recent Trends in planning applications in the area (2003 – 2007).



Table 5.2 - Future Population estimates using four different methods.

	2007	2012	2017	2022	2027
Development Plan	84	93	102	113	125
DED- Historical	84	97	111	128	147
CSO Pop& Labour Force- M2F2	84	88	91	93	94
Planning (2003-2007)	84	99	117	138	162

As can be seen from the above table the highest rate of increase of 3.34% per annum is associated with the number of current domestic planning permissions obtained in the last five (5) years. This gives a total future population of 162 persons. However this rate of increase does not take account of planning applications that were refused planning or those who sought outline planning only, during the same period.

It is reasonable to assume that the rate of increase in population could be in excess of 5% per annum if adequate infrastructure was in place. Therefore a growth rate of 6.97% (average of 10.6% +3.34%) will be taken as the adopted growth rate for Dungourney over the next 20 years. The adopted population is summarised in Table 5.3 below.

Table 5.3 – Adopted Population Projections for Dungourney

Dungourney	2,007	2012	2017	2022	2027
Domestic	84	118	165	231	323

5.2 Future Industrial / Commercial Flows

There are no areas zoned for future commercial development in Dungourney in the MEALAP. A limited increased demand in the commercial (shops, pubs, etc) sector should stem from the expected increase in population. In discussions to date, there has been no indication of any significant increase in the non-domestic. Providing spare capacity in the proposed wastewater treatment plant for future non-domestic loads would result in Cork County Council having to bear additional costs which may not be recovered. It is therefore proposed to allow for an increase in the non-domestic flow and load of 16% of the future domestic flows and loads. This is in line with previous studies and will cater for the commercial sector associated with the increased residential sector.

5.3 Summary of Future Flows and Loads

Clearly there is a risk in determining the required future capacity of wastewater treatment in Dungourney. This is because of the high estimated percentage growth rate associated with the



development of the zoned lands and the uncertainty with regard to the likelihood of future development proceeding.

It is proposed, therefore, to phase the provision of treatment capacity in Dungourney. It is considered that **Phase 1 (400 PE)** should provide for existing development, current development in the planning process/under construction, future development based on an annual increase of 6.97% and an allowance of 16% for future industrial/commercial flows.

Phase 2 (800 PE) will provisionally be sized to cater for the balance of development in the zoned areas. The expected flow and loads with the required wastewater treatment capacity for Phase 1 and Phase 2 is summarised below in **Table 5.4**.

Table 5.4 –Flows and Loads for Phase 1 and Phase 2

Description	Phase 1 Total(400 PE)	Phase 2 Total(800 PE)
Flow	72 m ³ /day	144 m ³ /day
Load	24 kg/day	48 kg/day
PE	400	800

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6.0 RECEIVING WATERS

6.1 Receiving Waters Quality

The receiving water for the Dungourney WWTP is the Dungourney River which rises approximately 8km north of Dungourney. Cork County Council confirmed that it has no abstractions for potable water usage from the Dungourney River. Irish Distillers in Midleton abstract water from the Dungourney River for their distillery process.

Dr. Eugene Bolton, Environmental Consultant, prepared a receiving water assimilative capacity assessment report for the Dungourney River at Dungourney, for Cork County Council in February 2007. Two grab samples were taken for chemical analysis on 23rd January 2007, one upstream and other downstream of the existing septic tank. The biological rating data was taken from the 2005 EPA River Water Quality Monitoring Programme. The flow data was taken from the, 'Register of Hydrometric Stations in Ireland 2007'.

The adopted existing water quality for the Dungourney River as derived in Dr. Bolton's receiving water assimilative capacity assessment report is shown below in **Table 6.1**. On the basis that there are no other water quality results available, these results will be used in the WYG assessment of the assimilative capacity of the Dungourney River.

There are no regulations governing the water quality of the Dungourney River. The water quality is compared, therefore, with the standards for A1 category water in the Surface Water Intended for the Abstraction of Drinking Water Regulations 1989 and with the standards in the Quality of Salmonid Waters Regulations 1988, both of which would be indicative of good quality water. In addition, the phosphorus levels are compared with the levels stated in the Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998 (Phosphorus Regulations, 1998).

Table 6.1-Dungourney River Background water quality concentrations

Parameter	Unit	Dungourney River
BOD ₅	mg/l	2
SS	mg/l	<10
NH ₃	mg/l- N	<0.02
NO ₃	mg/l - NO ₃	23.1
NO ₂	mg/l - N	<0.05
Total Phosphorus	mg/l- P	0.49
Q-Value		4

The results of the river sample analysis indicate that the river is generally of good quality.



Desirable water quality standards to be met downstream of the treated effluent discharge to the Dungourney River are set out in **Table 6.2** below. These standards are based on the requirements of current legislation and good practice.

Table 6.2- Water Quality Standards

Parameter	BOD ₅	SS	NH ₄ (N)	NO ₃	NO ₂ (N)	MRP(P)
Limit(mg/l)	3	25	1	25	0.05	0.03

6.2 River Flows

The Dungourney River is a tributary of the Owenacurra River. There is a flow monitoring station on the Dungourney River at Dungourney (Station No. 19038). The Dungourney River at Dungourney is reported to have a dry weather flow of 0.03m³/s and a 95% flow of 0.06m³/s.

The 95% flow was also assessed by calculating runoff based on river catchment area, rainfall and evapotranspiration measurements.

The closest weather station to Dungourney which measures potential evapotranspiration is at Cork Airport. Rainfall data was obtained from cork airport historical data.

Rainfall – 1,194mm / annum

Data received from Met Eireann for potential evapotranspiration at Cork Airport was as follows:

Potential evapotranspiration – 500mm/annum

The catchment area of the Dungourney River upstream of Dungourney village was measured from the 1:50,000 as 20.9km². The average runoff based on the above figures is calculated as follows:

Catchment Area	20,952,256	sq.m.
Rainfall	1,194	mm
Evapotranspiration	500	mm
Average Annual Flow	14,549,247	m ³ /year
Average Daily Flow	39,861	m ³ /day
Average Hourly Flow	1,661	m ³ /hour

The estimated 95%ile flow is taken as 10% of the average flow and therefore equates to 3,986.1m³/ day or 0.023m³/s.

The conservative figure of 0.023m³/s is taken as the 95% flow for the Dungourney River assimilative capacity calculations.



6.3 Assimilative Capacity of Current Scheme

The assimilative capacity of the Dungourney River for the current sewerage scheme (150 PE) is based on a 20%- 30% reduction of BOD₅ and Suspended Solids levels as would be the normal level of treatment from a septic tank and a dilution factor of 1:148. No reduction in Phosphate levels is assumed.

6.4 Assimilative Capacity of Proposed Scheme

Based on the discharge standards in **Table 6.1** and the assimilative capacity of Dungourney River we can see that there is a dilution capability of approximately 1: 55 in the river for a PE of 400. The increase in the BOD₅ level is less than 1 mg/l and the levels of suspended solids, Nitrate and Ammonia are within the desirable water quality standards for the Dungourney River. However based on 95% flows the residual level of Orthophosphates of 0.0423mg/l- P is outside the allowable of 0.03mg/l- P as the Dungourney River has a Biological Q rating of 4. This indicates that there is no assimilative capacity for Phosphorus in the Dungourney River. However the effects of Phosphorus are not instantaneous and build up over time. Therefore average flows are considered more appropriate when assessing the assimilative capacity for Orthophosphates. On this basis the Orthophosphate level was recalculated. Based on average flows, the residual level of Orthophosphates of 0.0268mg/l- P is within the allowable of 0.03mg/l- P for the Dungourney River.

Based on the discharge standards in **Table 6.1** and the assimilative capacity of Dungourney River we can see that there is a dilution capability of approximately 1:28 in the river for a PE of 800. The increase in the BOD₅ level is less than 1 mg/l and the levels of suspended solids, Nitrate and Ammonia are within the desirable water quality standards for the Dungourney River. However, based on the 95% flows the residual level of Orthophosphates of 0.0590mg/l- P is outside the allowable of 0.03mg/l- P as the Dungourney River has a Biological Q rating of 4. This indicates that there is no assimilative capacity for Phosphorus in the Dungourney River. However the effects of Phosphorus are not instantaneous and build up over time. Therefore average flows are considered more appropriate when assessing the assimilative capacity for Orthophosphates. On this basis the Orthophosphate level was recalculated. Based on average flows, the residual level of Orthophosphates of 0.0285mg/l- P is within the allowable of 0.03mg/l- P for the Dungourney River.

Refer to **Appendix B** for details of the assimilative capacity calculations.



7.0 PROPOSED WASTEWATER TREATMENT PLANT SITE

7.1 General

Dungourney is located predominantly around the 90m contour. OS maps and a walk over of the area were used to assess possible options for the location of the wastewater treatment plant. A wastewater treatment plant (WWTP) serving a gravity collection system and located adjacent to the treated effluent receiving waters of the Dungourney River would provide the best sustainable long term solution.

Lands generally gravitate from the north to the south of the village. From the east and west the lands gravitate towards the Dungourney River. Available riparian lands to the east of the river are steep or already developed and therefore are not considered suitable locations for the proposed WWTP. The riparian lands to the south and west are more accessible. Consequently three WWTP locations (A-C) were considered to the south of the village. Refer to **Figure 7.1** in **Appendix A** for details. The advantages and disadvantages of each option as well as environmental, engineering and economical impacts are discussed in further detail in the following sections.

7.2 Option A

This option is to upgrade facilities at the existing septic tank site with a requirement to purchase additional lands adjacent to the existing septic tank. The advantages and disadvantages over the other options are listed below.

Advantages:

- Existing gravity collection system currently serves this site;
- Site in Cork County Council possession.

Disadvantages:

- Site in close proximity to residential zoned areas and close to village centre;
- Some of the proposed zoned development area flows to the south of the site will have to be served by a pumped rising main system;
- Limited size to allow a DBO contractor flexibility in proposing options;

7.3 Option B

This option is to procure a new greenfield site adjacent to the development boundary. This option had the following advantages and disadvantages;

Advantages:

- Larger site therefore plant should be more efficient to operate;
- Gravity flow possible from all developments;
- Allows existing septic tank site to be decommissioned and used for suitable village centre development.



Disadvantages:

- Site in close proximity to zoned development areas;
- Site to be purchased;
- Planning Permission required;
- Wayleave required.

7.4 Option C

This option is to procure a new greenfield site at a suitable location outside the areas zoned for development. A site south of the development boundary and adjacent to the Dungourney River has been identified. The advantages and disadvantages of this option are listed below.

Advantages:

- Adequate space for all likely DBO contractor proposals;
- Gravity flow possible from all developments;
- No impact on currently zoned residential development areas;
- Further from residential areas than Options A and B;
- Allows existing septic tank site to be decommissioned and used for suitable village centre development.

Disadvantages:

- Planning permission required;
- Site to be purchased;
- Wayleave required

The sites were also assessed on environmental, engineering and economical grounds as follows;

7.5 Environmental

Option A would potentially have the greatest impact in respect of noise, odour, and landscape due to its proximity to houses. In addition the existing septic tank site in Dungourney is at present well overgrown. Options B & C would have a similar impact with respect to the environment. Options B and C have some screening at present but this can be further addressed through the planting of semi-mature trees if required at planning stage.

7.6 Engineering

Option A will require pumping of some of the development flows to the WWTP. Gravity flow, which is considered a more sustainable solution in the long term, is possible with Option B or C. The selection of Option B or C will require a new sewer to be laid from the entrance to the existing septic tank to the new WWTP site however. Option A will also require attention with respect to noise and odour.



7.7 Economical

A new collection system will be required in Dungourney to serve the new wastewater treatment plant. Option C will have the longest length of gravity sewer associated with it as it is the furthest distance away from the village. However there will be ongoing energy costs associated with the pumping requirements for Option A. The basic cost of the wastewater treatment plant would be expected to be similar in the case of all three options. However Option A would have greater costs associated with the mitigation of potential odour, noise and landscape impacts.

7.8 Conclusion

In balance of all things considered above, Option C is considered to be the most advantageous when considering the sustainable long term development of Dungourney as it is outside the zoned area for development. It also will be more suitable in allowing DBO contractors put forward the most cost efficient proposals for the WWTP. The cost of purchasing a new site could be offset partially or fully through the sale of the existing septic tank site following its decommissioning as the existing septic tank site is fully owned by Cork County Council.

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8.0 PROPOSED WASTEWATER TREATMENT PLANT FACILITIES

8.1 Flows and Loads

The estimated flows and loads, as calculated in Section 5 above, are set out again in **Table 8.1** below for Phase 1 and Phase 2 of the proposed WWTP.

Table 8.1 Proposed Flows and Loads

Description	Phase 1 Total(400PE)	Phase 2 Total(800PE)
Flow	72 m ³ /day	144 m ³ /day
Load(BOD ₅)	24kg/day	46 kg/day
PE	400	800

The proposed wastewater treatment plant will consist of secondary and tertiary treatment to achieve a minimum effluent standard shown in **Table 8.2** below. The standards are based on the assimilative capacity assessment in **Appendix B** for a 400PE plant.

Table 8.2- Dungourney WWTP Standards

Parameter	Limit	Units
BOD ₅	25.0	mg/l
SS	35.0	mg/l
Nitrate(NO ₃)	25	mg/l NO ₃
Ammonia	2	mg/l- N
Total Phosphorus	1.0	mg/l - P

8.2 Treatment Equipment

The design of the WWTP will be the responsibility of a DBO contractor and therefore, the required treatment processes are not specified in this design report. However, typical treatment processes are considered below for the purposes of providing cost estimates and producing typical layout drawings.



Inlet Works

The inlet works should be fully covered in order to minimise odour nuisance at the site boundary.

Screens with washing and dewatering facilities for the screenings should be provided. The screenings will be disposed of off site.

The existing collection system in Dungourney is a combined system. The future collection system in the scheme will provide discrete separation of storm water and foul waste water for all future developments. However, surface water will continue to enter the collection system. The need for grit removal equipment will be determined by the DBO contract based on his proposed design.

Biological Treatment

An extended aeration plant or sequence batch reactor plant are both suitable processes for secondary treatment. For the purposes of preparing cost estimates and producing layout drawings, an extended aeration plant has been adopted as the treatment process for the purposes of this report.

Final Settlement Tanks

Final settlement tanks (clarifiers) can be constructed from reinforced concrete or glass coated steel. The latter is cheaper and easier to build than the former, but will have higher maintenance costs.

Disinfection

Disinfection will not be required for the WWTP as there is no stated limit with respect to coliforms in the receiving water quality.

Phosphorus Removal

The WWTP will require practically full removal of phosphorus. This is possible to achieve in modern WWTP's through precipitation of the phosphorus following dosing. Dosing equipment and additional settlement capacity will be required.

Monitoring and Sampling

The influent and effluent monitoring and sampling is required as follows:-

- Provision of raw sewage continuous flow monitoring and facilities for 24-hour composite sampling;
- Provision of final effluent automatic flow monitoring and facilities for 24 hour composite sampling.



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- Provision of raw sewage continuous flow monitoring and facilities for 24-hour composite sampling;
- Provision of final effluent automatic flow monitoring and facilities for 24 hour composite sampling.



Process Unit	Unit	Volume
Biological Treatment (3xDWF)	m ³	100
Clarifiers	m ³	18
Gravity Sludge Thickening Tank (14 days storage)	m ³	16

8.4 Boundary Conditions

WWTP's can cause problems to neighbours through odour and noise nuisance. The Dungourney WWTP should conform to the following limits with respect to odour and noise in order to prevent an unacceptable environmental impact.

- Odour limit: - 3ou_E / m³ on a 98 percentile basis;
- Noise limit: - 55dBA (day time); 45dBA (night time).

8.5 Phasing / Modularity

The proposed WWTP is sized initially to provide treatment for a wastewater load from 400PE. Sufficient space should be provided on the site to allow expansion of the plant in the future to cater for a PE of 800. The initial construction should be carried out in a manner to facilitate this expansion in the future.

An indicative plant design has been prepared and includes for a control building, inlet works and pump sump (including screening and grit removal), flow measurement, emergency storage, secondary and tertiary treatment, an effluent outfall, site access road and a site boundary fence. Refer to **Figure 8.1** in **Appendix A** for details.

The point of discharge of treated effluent from the proposed outfall has been identified on **Figure 8.1** in **Appendix A** as Easting 193,237,427 and Northing 80,683,219.



9.0 PROPOSED COLLECTION SYSTEM

9.1 Proposed Foul Collection System

A simple 225mm diameter pre-cast concrete gravity collection system, as shown on **Figure 9.1** in **Appendix A**, would service the area within the development boundary and convey the domestic sewerage to the proposed treatment plant site to the south of the village and adjacent to the Dungourney River. A 140m section of the existing 225m diameter pre-cast concrete sewer is in good condition and could be retained as part of the proposed collection system. The existing houses would contribute foul and storm flows whereas any new housing would be separated.

9.2 Surface Water

Surface water from any new development could be collected in a separate storm collection system and percolated to the ground or discharged to the Dungourney River. The collection and discharge of the surface water will be developer driven and will be developed as required.

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10.0 BUDGET COSTS

10.1 Basis of Costs

The unit costs used in the preparation of the cost estimate have been derived from recent contract costs where available or updated from older contract costs where not available.

10.2 Project Costs

The estimated contract costs for Phase 1 are detailed in **Appendix E** and are summarised below in **Table 10.1**.

Table 10.1 Summary of Cost Estimates

Description	Amount (€)
Total Cost of Civil Works	€ 805,161.00
Total Cost of M&E Works	€ 136,620.00
Sub-total	€ 941,781.00
Vat @ 13.5%	€ 127,140.44
Total Contract Costs	€ 1,068,921.44
Non-Contract Costs	€ 341,070.00
Capital Cost	€ 1,409,991.44

10.3 Unit Costs

The following unit costs per PE have been calculated for the Dungourney WWTP Phase 1.

Table 10.2 - Unit Costs for Phase 1

PE	400
Cost per PE	€ 3,524.98



11.0 CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusions

The existing septic tank in Dungourney is inadequate to treat current and future sewage flows and loads to the required level. Upgrading the existing plant or the provision of a new WWTP is required to treat an estimated Phase 1 PE of 400. Provision should be made to allow for expansion of the WWTP to cater for a Phase 2 PE of 800.

WYG reviewed all existing relevant reports and found that they are generally in line with the WYG proposals stated in this report. However, WYG determined that previous recommendations on the standards of treated effluent to the Dungourney River are more onerous than necessary. The recommended treated effluent standards are given in Section 8.0 of this report.

11.2 Recommendations

The following recommendations are made with respect to the treatment of municipal wastewater in Dungourney.

- A new WWTP to be constructed on a new site south of Dungourney;
- The existing collection system to be extended to divert wastewater flows to the new WWTP;
- Phase 1 of the WWTP to cater for a Phase 1 PE of 400;
- Provision to be made in the construction of the Phase 1 plant and space to be allowed to expand the WWTP to cater for Phase 2, 800 PE in the future, if required.

The total estimated capital cost of the above is €1,409,991.44



Accreditation Certificate

Cork County Council

Wastewater Testing Laboratory, Inniscarra, Co. Cork

Testing Laboratory

Registration number: 016T

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

Date of award of accreditation: 01:10:2002

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

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

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

Manager: Tom Dempsey

Mr Tom Dempsey

Chairperson: Maire Walsh

Dr Máire Walsh

Issued on 23 June 2008

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

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

Schedule of Accreditation



(Annex to Accreditation Certificate)

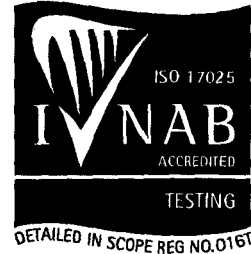
Permanent Laboratory:
Category A

CORK COUNTY COUNCIL

Chemistry Testing Laboratory

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

Schedule of Accreditation



Permanent Laboratory:
Category A

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

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

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

Testing and Calibration Categories:

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

Standard Specification or Test Procedure Used:

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

Glossary of Terms

Facilities:

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

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

Scope of Accreditation



Cork County Council
Chemical Testing Laboratory

Permanent Laboratory:
 Category A

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

Scope of Accreditation



Cork County Council
Chemical Testing Laboratory

Permanent Laboratory:
 Category A

INAB Classification number (P9) Materials/products tested	Type of test/properties measured Range of measurement	Standard specifications Equipment/techniques used
766 Waters .01 Waters for domestic purposes <i>Surface and ground waters</i>	Orthophosphate as P (Konelab) Range: 0.005-1.00 mg O-PO4 P/L High Range: 1000 mg O-PO4 P/L Method Detection Limit: 0.02 mg O-PO4 P/L Chloride (Konelab) Range: 25-250 mg/L Cl- High Range Conc.: 86,000 mg/L Cl- Method Detection Limit: 25 mg/L Cl- Sulphate (Konelab) Range: 30-250 mg/L SO4/L High Range Conc.: 35,000 mg/L SO4/L Method Detection Limit: 30 mg SO4/L	CP No. 23 Ascorbic Acid Method CP No. 24 Ferricyanide Method CP No. 25 Documented in-house method by Konelab based on method for the examination of waters and waste waters and associated material HMSO: 1981

Scope of Accreditation



Cork County Council
Chemical Testing Laboratory

Permanent Laboratory:
Category A

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

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

Scope of Accreditation



**Cork County Council
Chemical Testing Laboratory**

Permanent Laboratory:
Category A

INAB Classification number (P9) Materials/products tested	Type of test/properties measured Range of measurement	Standard specifications Equipment/techniques used
766 Waters	Chemical analysis	Documented in-house methods based on Standard Methods for the Examination of Water & Wastewater, 21st Edition APHA (See Note 1)
.05 Trade Wastes Industrial effluents Urban Wastewater Municipal Wastewater	Orthophosphate as P (Konelab) Range: 0.005 - 1.00 mg O-PO ₄ P/L High Range: 1000 mg O-PO ₄ P/L Method Detection Limit: 0.02 mg O-PO ₄ P/L	CP No. 7 Membrane electrode CP No. 23 Ascorbic Acid Method
	Chloride (Konelab) Range: 25-250 mg/L Cl- High Range Conc.: 86,600 mg /L Cl- Method Detection Limit: 25mg / L Cl-	CP No. 24 Ferricyanide Method
	Sulphate (Konelab) Range: 30-250 mg/L SO ₄ /L High Range Conc.: 35,000 mg/L SO ₄ /L Method Detection Limit: 30 mg SO ₄ /L	CP No. 25 Documented in-house method by Konelab based on method for the examination of waters and waste waters and associated material HMSO: 1981

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

Attachment F

Shellfish Water Pollution Reduction Plan

As required by Article 5 of the Shellfish Water Directive 2006/113/EC and
Section 6 of the Quality of Shellfish Waters Regulations, 2006 (S.I. No. 268 of 2006)

Characterisation Report Number 39

**CORK GREAT ISLAND NORTH CHANNEL
SHELLFISH AREA
COUNTY CORK**

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ABBREVIATIONS

AA	Appropriate Assessment
BOD	Biochemical Oxygen Demand
CFB	Central Fisheries Board
CSO	Combined Storm Overflow
DED	District Electoral Division
DEHLG	Department of Environment Heritage and Local Government
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
EU	European Union
Ha	Hectare
IPPC	Integrated Pollution Prevention Control
Kg	Kilogram
LU	Livestock Units
NACE	European industrial activity classification
MI	Marine Institute
NPWS	National Parks and Wildlife Service
OSWTS	On-Site Waste Water Treatment System
P.E.	Population Equivalent
PRP	Pollution Reduction Plan
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFPA	Sea Fisheries Protection Authority
SPA	Special Protection Area
SWMC	Shellfish Waters Management Committee
TCE	Tetrachloroethylene
WFD	Water Framework Directive
WSIP	Water Services Investment Programme
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant

1.0 INTRODUCTION

Article 5 of the Shellfish Directive (2006/113/EC) and section 6 of the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006) require the development of Pollution Reduction Plans (PRPs) for designated shellfish areas in order to support shellfish life and growth and to contribute to the high quality of directly edible shellfish products. Shellfish PRPs relate to bivalve and gastropod molluscs, including oysters, mussels, cockles, scallops and clams. They do not cover shellfish crustaceans such as crabs, crayfish and lobsters.

1.1 Aims and responsibility

The objectives of Shellfish PRPs are to:

- Protect or improve water quality in designated shellfish areas;
- Achieve compliance with water quality parameter values outlined in Annex I of the Shellfish Waters Directive (2006/113/EC) and Schedules 2 and 4 of the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006);
- Determine the factors responsible for any non-compliances with the water quality parameter values; and
- Ensure that implementation of the Shellfish PRPs does not lead, directly, or indirectly, to increased pollution of coastal and brackish waters.

Under the Regulations, the Department of the Environment, Heritage and Local Government (DEHLG) is responsible for Shellfish PRPs. An Inter-Departmental /Inter Agency Shellfish Waters Management Committee (SWMC) supports the Department in their development. There is also an obligation on every public authority to perform its functions in a manner that promotes compliance with the Directive and the Regulations, and to take such actions as are necessary to secure compliance with the Directive and the Regulations and with the Shellfish PRPs.

1.2 Shellfish water quality parameters

Compliance with the directive is measured against achievement of shellfish water quality parameter values outlined in Annex I of the Shellfish Waters Directive (2006/113/EC) and Schedules 2 and 4 of the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006). Table 1 summarizes these values. Imperative (I) values must be fully achieved while it must be endeavoured to achieve guideline values (G).

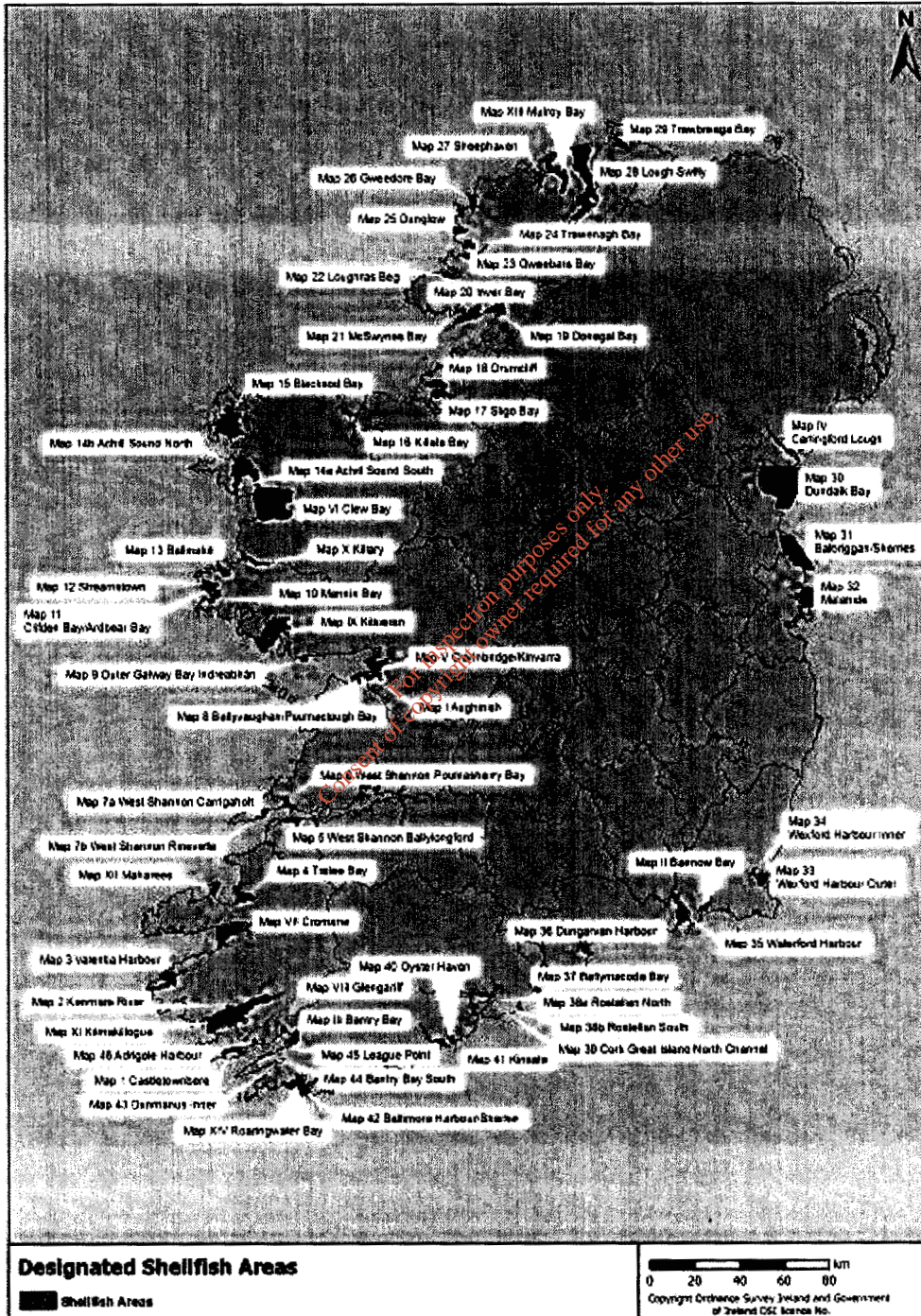
TABLE 1 - Parameters listed in Annex I of the Shellfish Water Directive

Physical	Guideline Values (G)	Imperative Values (I)
pH (pH units)		7 – 9 pH units
Temperature (°C)	A discharge affecting shellfish waters must not cause the temperature of the waters to exceed by more than 2°C the temperature of waters not so affected	No mandatory value set in the Directive

Colouration (after filtration) (mg Pt/l)		A discharge affecting shellfish waters must not cause the colour of the waters after filtration to deviate by more than 10 mg Pt/l from the colour of unaffected waters
Suspended Solids (mg/l)		A discharge affecting shellfish waters must not cause the suspended solid content of the waters to exceed the content in unaffected waters by more than 30%
Salinity (%)	12 to 38%	≤ 40% A discharge affecting shellfish waters must not cause their salinity to exceed the salinity of unaffected waters by more than 10%
Chemical	Guide Value (G)	Mandatory Value (I)
Dissolved oxygen (Saturation %)	≥ 80%	≥ 70% Should an individual measurement indicate a value lower than 70%, measurements shall be repeated An individual measurement may only indicate a value of less than 60% if there are no harmful consequences for the development of shellfish colonies
Petroleum hydrocarbons		Hydrocarbons must not be present in the shellfish water in such quantities as to: - produce a visible film on the surface of the water and/or a deposit on the shellfish - have harmful effects on the shellfish
Organohalogenated substances	The concentration of each substance in shellfish flesh must be so limited that it contributes in accordance with Article 1 (of the Directive), to the high quality of shellfish products	The concentration of each substance in the shellfish water or in shellfish flesh must not reach or exceed a level which has harmful effects on the shellfish larvae
Metals (Ag, As, Cd, Cr, Cu, Hg, Ni, Pb and Zn) (mg/L)	The concentration of each substance in shellfish flesh must be so limited that it contributes in accordance with Article 1 (of the Directive), to the high quality of shellfish products	The concentration of each substance in the shellfish water or in the shellfish flesh must not exceed a level which gives rise to harmful effects on the shellfish and their larvae The synergic effects of these metals must be taken into consideration
Others	Guide Value (G)	Mandatory Value (I)
Faecal coliforms (per 100 mL)	≤ 300 per 100 mL in the shellfish flesh and intervalvular liquid	No mandatory value set in the Directive
Substances affecting the taste of shellfish		Concentration lower than liable to impair the taste of the shellfish
Saxitoxin (produced by dinoflagellates)	No limit given	No limit given

1.3 Designated shellfish areas

Fourteen shellfish areas were originally designated in 1994 under the Quality of Shellfish Waters Regulations (S.I. No. 200 of 1994, revoked by S.I. No. 268 of 2006). A further 49 areas were subsequently designated in 2009 under the European Communities (Quality of Shellfish Waters) (Amendment) Regulations, 2009 (S.I. No. 55 of 2009). All 63 designated sites are illustrated in Figure 1 below.



Note: Map numbers I to XIV refer to waters originally designated under the European Communities (Quality of Shellfish Waters) Regulations 2004 (S.I. No. 200 of 1994), while map numbers 1 to 49 refer to waters designated under the European Communities (Quality of Shellfish Waters) (Amendment) Regulations 2009 (S.I. 55 of 2009). The referenced maps can be found in the relevant regulatory documents.

FIGURE 1 - 63 designated shellfish areas

1.4 Development of the Shellfish Pollution Reduction Plans

The Directive and Regulations require that any non-compliances with the shellfish water quality parameters values are identified. The Directive and Regulations further require that the factors responsible for such non-compliances are identified.

Information on impacts and pressures has therefore been collated in an individual characterisation report for each shellfish site from available inventories. The likelihood of the pressures to impact on shellfish water quality parameter values in the shellfish areas has been estimated.

Individual site Pollution Reduction Plans (PRPs) and a supporting toolkit of measures outline the measures which can be used to control pressures where necessary to protect and improve water quality in a specific shellfish area.

The 2009 characterisation and PRPs represent an initial phase of Shellfish PRP development, drawing on available information sources. Its development has been a desk-based exercise and it provides a good indication of the main pressures likely to be impacting on shellfish water quality and the measures that can be used to control those pressures. Ongoing assessment and monitoring of shellfish waters will be used to confirm the effectiveness of these programmes and to refine the programmes where necessary. As the shellfish monitoring database grows, and as programmes are implemented, incremental changes will be made to ensure compliance with the standards and objectives established.

PRPs produced during 2009 supersede Action Programmes which were developed in 2006 for the 14 original shellfish areas.

1.5 Assessment of the Shellfish Pollution Reduction Plan

A Strategic Environmental Assessment (SEA) of the draft Shellfish PRP is being undertaken in accordance with the requirements of the EU Strategic Environmental Assessment Directive (2001/42/EC). SEA is a process for evaluating, at the earliest appropriate stage, all of the possible environmental effects of plans or programmes before they are adopted while giving the public and other interested parties an opportunity to comment and to be kept informed of decisions and how they were made. The assessment of the draft PRP resulted in mitigation of some of the measures in the draft PRP that were identified as likely to lead to adverse effects on other aspects of the environment. The reports associated with the SEA process can be downloaded from www.environ.ie.

An 'Appropriate Assessment' of the draft Shellfish PRP is being carried out in parallel with the SEA assessment in accordance with the requirements of the EU Habitats Directive (92/43/EEC). Appropriate Assessment is a process for evaluating the implications of plans or programmes for sites which have been designated for the protection and conservation of habitats and species of European importance. The reports associated with the Appropriate Assessment can be downloaded from www.environ.ie.

1.6 Links with the River Basin Management Plans

The EU Water Framework Directive (2000/60/EC) provides a framework for the protection and restoration of the aquatic environment and terrestrial ecosystems and wetlands directly depending on the aquatic environment. In accordance with the requirements of the directive, River Basin Management Plans (RBMPs) were published in draft form in December 2008 with the final RBMPs to be published in December 2009. They are the primary plans in place in relation to the water environment for the foreseeable future.

The WFD strengthens and consolidates a number of existing environmental directives while repealing others on a phased basis. The Shellfish Directive is due to be repealed by the WFD in 2013. It is therefore very important that the Shellfish PRP is closely aligned with the RBMPs.

1.7 Layout of the draft Shellfish Pollution Reduction Plan

Characterisation Report

- **Section 1**
Section 1 is an introductory section which puts the Characterisation Reports in context and outlines their contents.
- **Section 2**
Section 2 describes the general characteristics of the designated shellfish areas as well as their contributing catchments.
- **Section 3**
Section 3 describes water quality in the designated shellfish areas.
- **Section 4**
Section 4 consists of a series of maps illustrating the general characteristics of the shellfish areas and catchments, as well as the marine and land-based pressures in the catchments.
- **Section 5**
Section 5 provides a series of tables summarising the marine and land-based pressures in the catchments. The likelihood of the pressures to impact on shellfish water quality parameters is discussed. A summary is also provided highlighting the key pressures which are most likely to impact on shellfish water quality parameters. The discussions in this section draw on available information including information generated during the WFD implementation process and geographical features of significance. The differing nature of the pressures are also taken into account as pressures vary substantially in terms of how severely they are likely to impact on shellfish water quality parameters.

Pollution Reduction Programme

- The Pollution Reduction Programme summarises the specific measures identified for controlling pressures which impact on Cork Great Island and North Channel shellfish water quality parameters. This can be downloaded from www.environ.ie

Toolkit of Measures

- The supporting toolkit of measures outlines all of the measures available for controlling pressures which impact on shellfish water quality parameters. This can be downloaded from www.environ.ie.

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2.0 GENERAL CHARACTERISTICS

Name	Cork Great Island North Channel Shellfish Area
Map number	39
Year of designation	2009
Area	3.4 km ²
River Basin District	South Western RBD
County	Cork
Location of sampling point	51 deg 53.025 min (Lat) 8 deg 16.024 min (Long)
Catchment area	1,705.5 km ²
Catchment area within 20 km zone	542.2 km ²
Adjacent PRP	Rostellan (North, South and West (proposed))

Cork Great Island North Channel shellfish area is situated in County Cork in the South Western River Basin District (Map 1). The designated shellfish area is 3.4 km² and extends from Weir Island as far as the furthest reach of Brown Island. The designated area is quite isolated from the main body of Cork Harbour and is connected only by two relatively small channels, the Belvelly Channel to the west and Ballynacorra River to the southeast. There are two designated shellfish areas and a third (proposed) area in the adjacent tidal waters at Rostellan.

Cork Harbour is the second largest natural harbour in the world by navigational area. It is situated at the mouth of the River Lee and has a number of large islands, Fota Island, Great Island and Little Island, which are connected to the mainland by roads, as well as a number of smaller islands. The River Lee separates into two channels to form the Central Island of the City. There are a number of smaller streams namely the Tramore, Glasheen and Curragheen Rivers, which drain the Southside of the city and the Bride and the Glen Rivers that drain the Northside.

The contributing catchment is 1,705.5 km² in area (Map 3). Cork City is the largest urban area in the catchment, and the second largest in Ireland, with a population of 119,418. The population of the extended catchment which includes the towns of Middleton, Carrigtwohill, Cobh, Ringaskiddy, Carrigaline and Crosshaven is estimated to be 236,481 (CSO 2006).

The estimated farmed area in the catchment is approximately 520 km² with the majority dedicated to grassland and the remainder to tillage. There are approximately 102,088 cattle and 18,330 sheep (CSO 2000).

2.1 Protected areas

The designated shellfish area lies within Cork Great Island North Channel cSAC (Map 11). Cork Harbour is both an SAC and an SPA. Nutrient sensitive areas in the

catchment include the Lee and Owennacurra estuaries. Drinking water sources include the Butlerstown, Lee, Glashaboy and Owenacurra rivers.

2.2 Aquaculture activity

Table 2 summarises the number and area of aquaculture licensed areas within the designated shellfish area. Oyster cultivation is predominant in the area (Map 2).

TABLE 2 - Aquaculture licensed areas

Fishing and aquaculture types	Number	Area	% Area
Abalone	0	0	0 %
Clams	0	0	0 %
Cockles	0	0	0 %
Lobsters	0	0	0 %
Scallops	0	0	0 %
Mussels	0	0	0 %
Oysters	6	1.5 km ²	44 %
Sea Urchins	0	0	0 %
Periwinkles	0	0	0 %
Salmonid	0	0	0 %
Seaweed	0	0	0 %
Other	0	0	0 %

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3.0 WATER QUALITY IN THE SHELLFISH AREA

Dedicated shellfish monitoring data has been collated and compared with shellfish water quality parameter mandatory and guideline values outlined in Annex I of the Shellfish Waters Directive (2006/113/EC) and Schedule 2 and 4 of the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006) (Table 1).

Additional monitoring data from other monitoring programmes has also been collated in order to highlight any water quality issues in the vicinity of the shellfish areas. This can aid in the identification of the pressures most likely to impact on the shellfish areas and thereby in the identification of any measures to be applied. Datasets were collated from the Environmental Protection Agency (EPA), the Marine Institute (MI) and the Sea Fisheries Protection Authority (SFPA). Where applicable these additional monitoring data were compared with the shellfish water quality parameter mandatory and guideline values outlined in Annex I of the Shellfish Waters Directive (2006/113/EC) and Schedules 2 and 4 of the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006) (Table 1).

Marine Institute Shellfish Monitoring Programme

The MI carries out shellfish monitoring at designated shellfish areas. This dedicated shellfish monitoring programme involves analysing for general components, metals and organics in both water and biota samples. The results have been compared with the shellfish mandatory and guideline values outlined in Table 1.

For this shellfish area, 4 biota samples were available from between 2005 and 2008. The shellfish guideline values for biota outlined in Table 1 were not breached in any of the available samples.

Faecal coliform biota results were also available from the MI at all shellfish areas from November 2008 as well as for February, May and August 2009. The shellfish guideline value for faecal coliforms in biota outlined in Table 1 was not breached in any of the Cork Great Island North Channel samples.

EPA Marine Monitoring Programme

The EPA Marine Monitoring Programme analyses for general components in water samples at a large number of marine sites around Ireland.

There are 2 EPA sites located in the area with monitoring data available from the period 2006 to 2008 for pH and dissolved oxygen. The shellfish mandatory values outlined in Table 1 for these parameters were not breached in either of the samples.

WFD Monitoring Programme

WFD status classifications from the WFD monitoring programme apply at the water body scale and are generally based on several samples/surveys targeting a variety of parameters including biological, physico-chemical, chemical and hydromorphological elements. The monitoring information on which the marine status classifications are

based was collected by the EPA, the MI, the National Parks and Wildlife Service (NPWS) and the Central Fisheries Board (CFB) between 2005 and 2008.

The WFD status of the transitional water body, within which the shellfish area is situated, is 'moderate' and therefore unsatisfactory, reflecting the results of dissolved inorganic nitrogen and dissolved oxygen analysis in some of the samples. The two main transitional waters which discharge into the designated shellfish area are the Owencurra Estuary and Lough Mahon. Both are considered 'moderate', and therefore unsatisfactory, also reflecting the results of dissolved inorganic nitrogen and dissolved oxygen analysis and, in the case of the Owenacurra Estuary, the results of biological oxygen demand analysis and the status of fish populations (Map 12).

Shellfish Flesh Monitoring Programme

Shellfish flesh classifications (carried out under the European Communities (Live Bivalve Molluscs) (Health Conditions for Production and Placing on the Market) Regulations, 1996 (S.I. No. 147 of 1996), as amended by the European Communities (Live Bivalve Molluscs) (Health Conditions for Production and Placing on the Market) (Amendment) Regulations, 2000 (S.I. No. 390 of 2000)) indicate faecal contamination in shellfish flesh. Sampling is carried out by the Sea Fisheries Protection Authority (SFPA) on at least a monthly basis.

The licensed area is classified as Class B meaning that shellfish may be placed on the market for human consumption only after treatment in a purification centre or after relaying so as to meet the health standards for live bivalve molluscs laid down in the EC Regulation on food safety (Regulation (EC) No 853/2004). This indicates faecal contamination in this shellfish area.

However, a Prohibition Order has been in effect since 15th of October 2002 under the amended Regulations in relation to the harvesting and placing on the market of oysters from the North Channel area of Cork Harbour. This is due to viral contamination of the oysters. The Oyster production beds and depuration plant of the North Channel remain closed and viral monitoring in this area is ongoing. The latest Norovirus monitoring results show that this virus continue to be detected in the shellfish sampled in this area and no discernable change has been seen.. The levels show a strong seasonal trend and are at their highest during the winter months and may be absent during some of the summer months.

Overall Water Quality

The dedicated shellfish samples available for this shellfish area were found to be compliant with shellfish mandatory and guideline values outlined in Annex I of the Shellfish Waters Directive (2006/113/EC) and Schedule 4 of the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006) (Table 1). Ongoing shellfish monitoring will strengthen the assessment of compliance status at this shellfish area.

The results of the WFD monitoring programme indicate that there are water quality issues with dissolved inorganic nitrogen and dissolved oxygen within the area and in some of the waters discharging in the vicinity of this shellfish area.

The shellfish flesh classification undertaken for food hygiene purposes indicates Class B waters i.e. faecal contamination in this shellfish area.

A prohibition order on the harvesting of oysters in this shellfish area has been in place since 2002 due to viral contamination. This area is subject to an on-going viral monitoring programme.

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4.0 CHARACTERISATION MAPS

The following series of maps illustrate the general characteristics of the designated shellfish area and its contributing catchment, as well as the marine and land-based pressures that could potentially impact on the shellfish area. The pressures are further divided into point source pressures, diffuse source pressures and morphological pressures.

Some of the point source pressures are symbolised according to whether they are 'at risk' or 'not at risk'. These risk designations were developed during the WFD implementation process. Some of the designations date back to the Article V characterisation process in 2004 and 2005 but many of the risk designations were updated in 2008 to feed into the draft RBMPs. The risk designations are based on a variety of information, for example, waste water treatment plants can be designated as 'at risk' because they are serving a larger population than they were designed to cater for or because their discharges are impacting on water quality. Section 5 of this characterisation report provides the detail behind the risk designations for each of the pressures and discusses their likelihood to be impacting on shellfish water quality parameters.

Whilst the risk designations under the WFD provide a useful screening tool for pressures, their relevance in terms of any water quality issues measured in Shellfish Waters has been assessed in further detail to identify key pressures at a particular site. For example the WFD risk may be based on particular impacts to freshwater ecology which are not pertinent to the shellfish water status.

TABLE 3 - List of maps

Map No.	Map Title	Details
General Characteristics Maps		
MAP 1	Designated shellfish area	Designated shellfish area with summary statistics.
MAP 2	Licensed aquaculture areas	Department of Agriculture, Fisheries and Food register of licensed aquaculture areas within the designated shellfish area.
MAP 3	Contributing catchment	Nested river water bodies and inter-coastal freshwater bodies discharging in the vicinity of the designated shellfish area.
MAP 4	Topography	Topography of the contributing catchment.
MAP 5	Soil wetness	Soil wetness which indicates drainage characteristics
MAP 6	Vulnerability of groundwaters to pathogens from subsoil discharges	Potential risk of pathogens from sub-soils discharges reaching groundwaters. Based on vulnerability, presence of alluvium, mineral content of soils, wetness, aquifer type, subsoil depth and subsoil permeability.

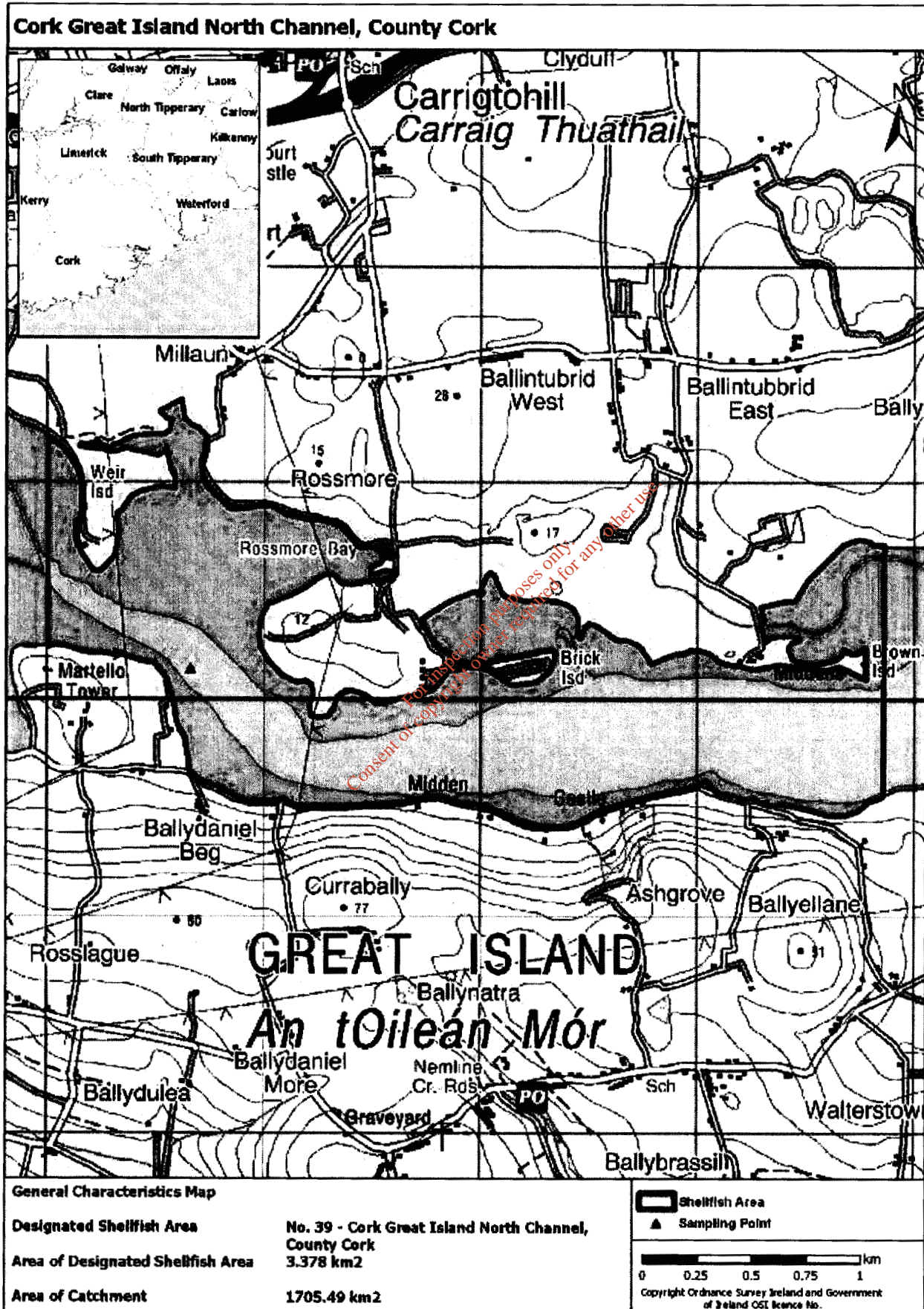
Map No.	Map Title	Details
MAP 7	Vulnerability of groundwaters to phosphorus from subsoil discharges	Potential risk of phosphorus from sub-soils discharges reaching groundwaters. Based on vulnerability, presence of alluvium, mineral content of soils, wetness, aquifer type, subsoil depth and subsoil permeability.
MAP 8	Vulnerability of surface waters to pathogens from subsoil discharges	Potential risk of pathogens from sub-soils discharges reaching surface waters. Based on vulnerability, presence of alluvium, mineral content of soils, wetness, aquifer type, subsoil depth and subsoil permeability.
MAP 9	Vulnerability of surface waters to phosphorus from subsoil discharges	Potential risk of phosphorus from sub-soils discharges reaching surface waters. Based on vulnerability, presence of alluvium, mineral content of soils, wetness, aquifer type, subsoil depth and subsoil permeability.
MAP 10	Likelihood of inadequate percolation in subsoils	Likelihood of inadequate percolation in subsoils. Based on aquifer type, vulnerability and subsoil permeability.
MAP 11	Designated protected areas	SACs, SPAs, freshwater pearl mussel areas, recreational waters, drinking waters, nutrient sensitive areas, water dependant habitats and RAMSAR sites within the contributing catchment.
MAP 12	WFD surface water status	River, lake, transitional and coastal water body status resulting from the WFD monitoring programme.
MAP 13	EPA diffuse risk assessment	Water body based risk to waters from diffuse sources. Based on the percentages of diffuse land cover per water body including peatlands, coniferous forestry, agriculture and urban areas.
Marine Pressures Maps		
Point Source Pressures		
MAP 14	Marine finfish farms	Marine finfish farms in the vicinity of the designated shellfish area. Taken from the Marine Atlas.
Morphology Pressures		
MAP 15	Fishing gear activity	Fishing gear activity in the vicinity of the designated shellfish area. Taken from the Marine Atlas.
MAP 16	Structures	Marine morphology structures such as bridges and causeways

Map No.	Map Title	Details
MAP 17	Physical modifications	Physical modifications such as shoreline reinforcement, embankments, reclaimed land, capital and maintenance dredging, aggregate removal, dumping at sea and heavily modified waters within the designated shellfish area.
Land-based Pressures Maps		
Point Source Pressures		
MAP 18	Municipal waste water systems	Urban waste water treatment plants and combined sewer overflows within the contributing catchment. These are symbolized based on their risk designations.
MAP 19	Agricultural and aquacultural point source pressures	Pig units, and freshwater fish farms within the contributing catchment.
MAP 20	Industrial point source pressures	Industrial IPPCs, Section 4s, water treatment plants, abstractions, mines, quarries, landfills and contaminated sites within the contributing catchment. These are symbolized based on their risk designations.
Diffuse Source Pressures		
MAP 21	On-site waste water systems	On-site waste water treatment plants within the contributing catchment.
MAP 22	Dairy and drystock livestock units	Dairy and drystock livestock units per hectare of farmed land within each DED in the contributing catchment.
MAP 23	Nitrogen fertiliser usage	Nitrogen fertiliser usage per hectare of farmed land within each DED in the contributing catchment.
MAP 24	Phosphorus fertiliser usage	Phosphorus fertiliser usage per hectare of farmed land within each DED in the contributing catchment.
MAP 25	Forestry types with acidification risk areas	Forest cover in the contributing catchment with areas identified as being at risk from acidification.
MAP 26	Forestry types with eutrophication risk areas	Forest cover in the contributing catchment with areas identified as being at risk from eutrophication.
MAP 27	Forestry types with sedimentation risk areas	Forest cover in the contributing catchment with areas identified as being at risk from sedimentation.
Morphology Pressures		

Map No.	Map Title	Details
MAP 28	Structures	Barriers to migration, both natural and man-made in the contributing catchment.
MAP 29	Physical modifications	Channelisation, heavily modified and artificial water bodies in the contributing catchment.

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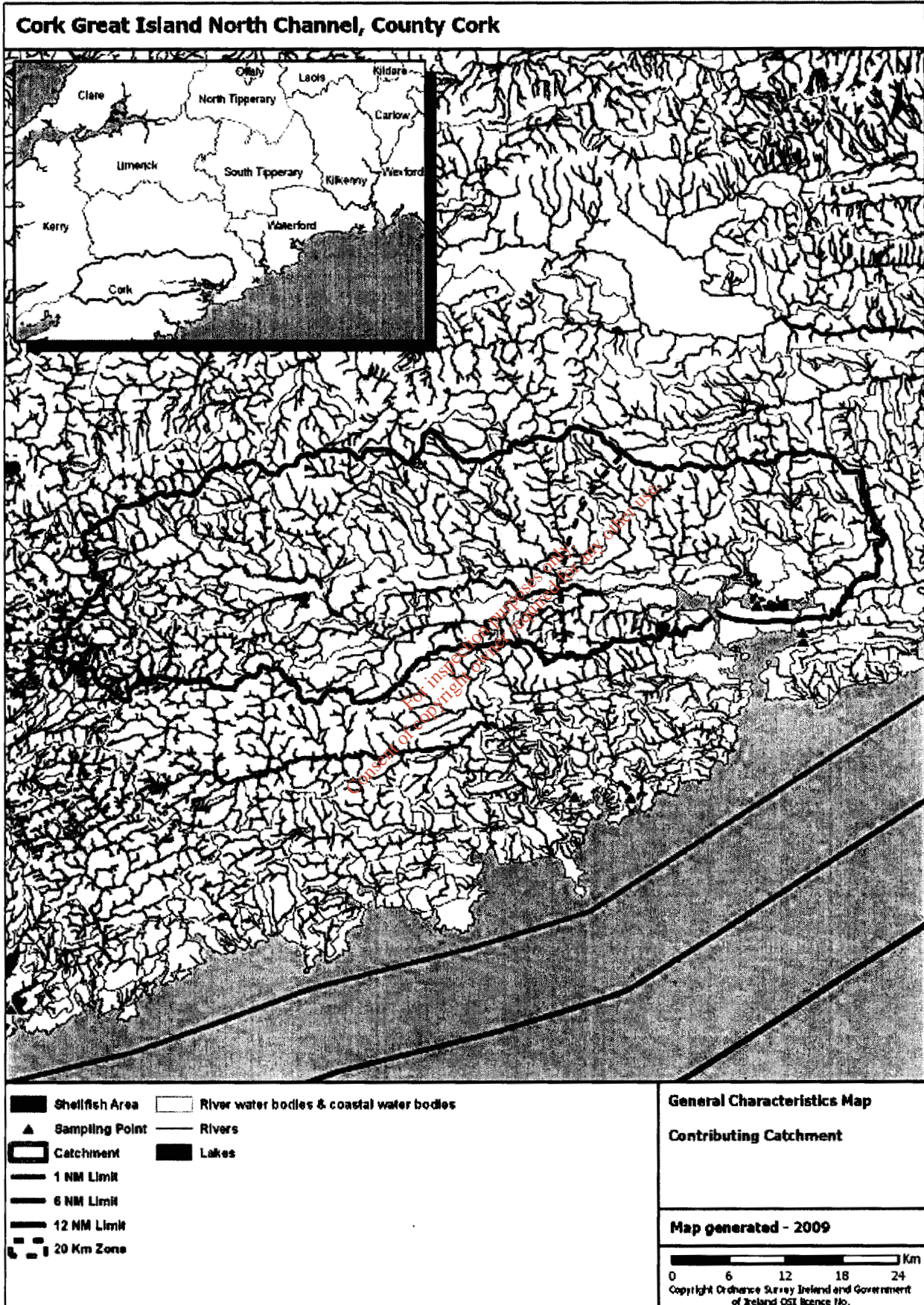
MAP 1 - Designated shellfish area



MAP 2 - Licensed aquaculture areas

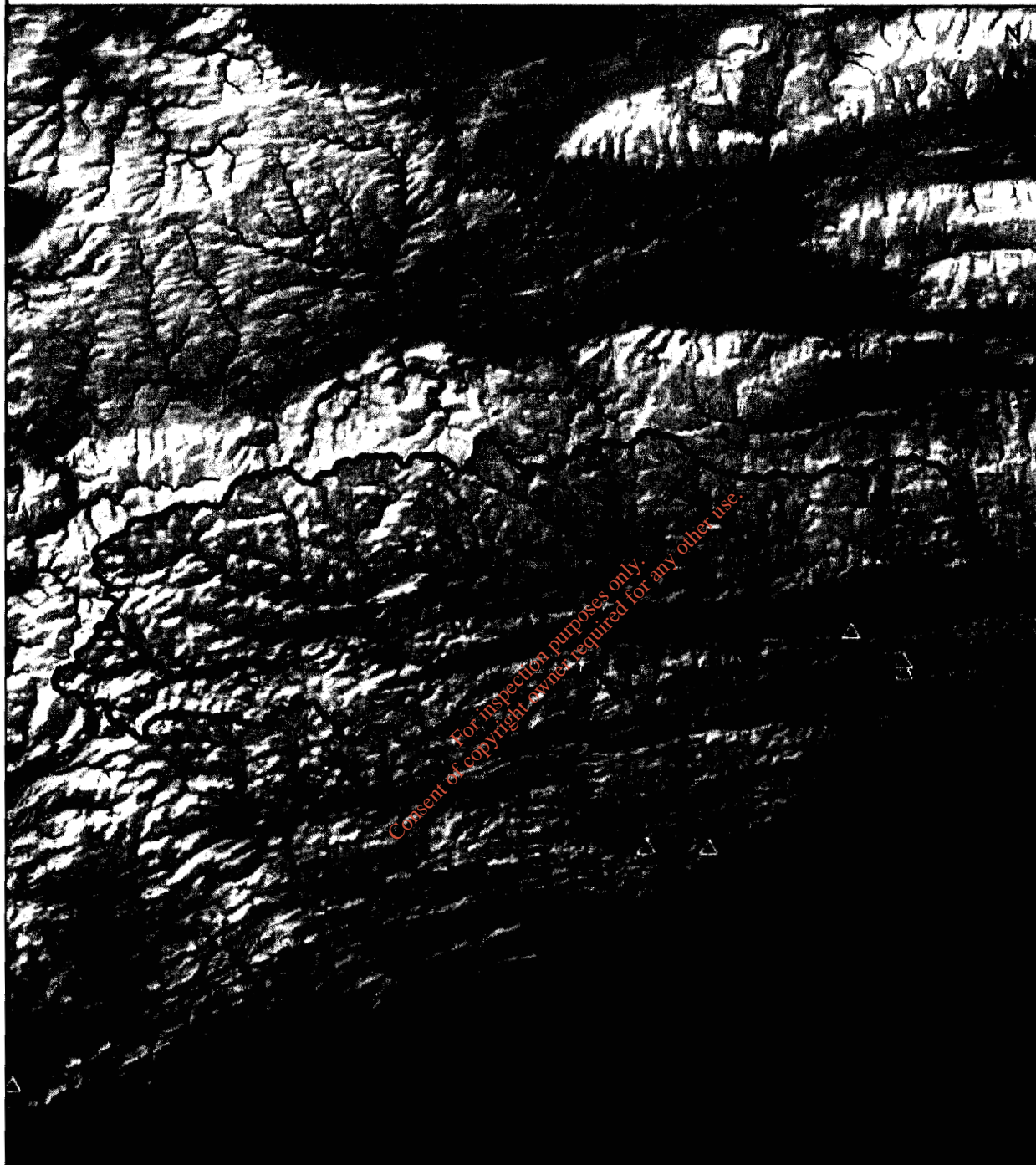


MAP 3 - Contributing catchment



MAP 4 – Topography

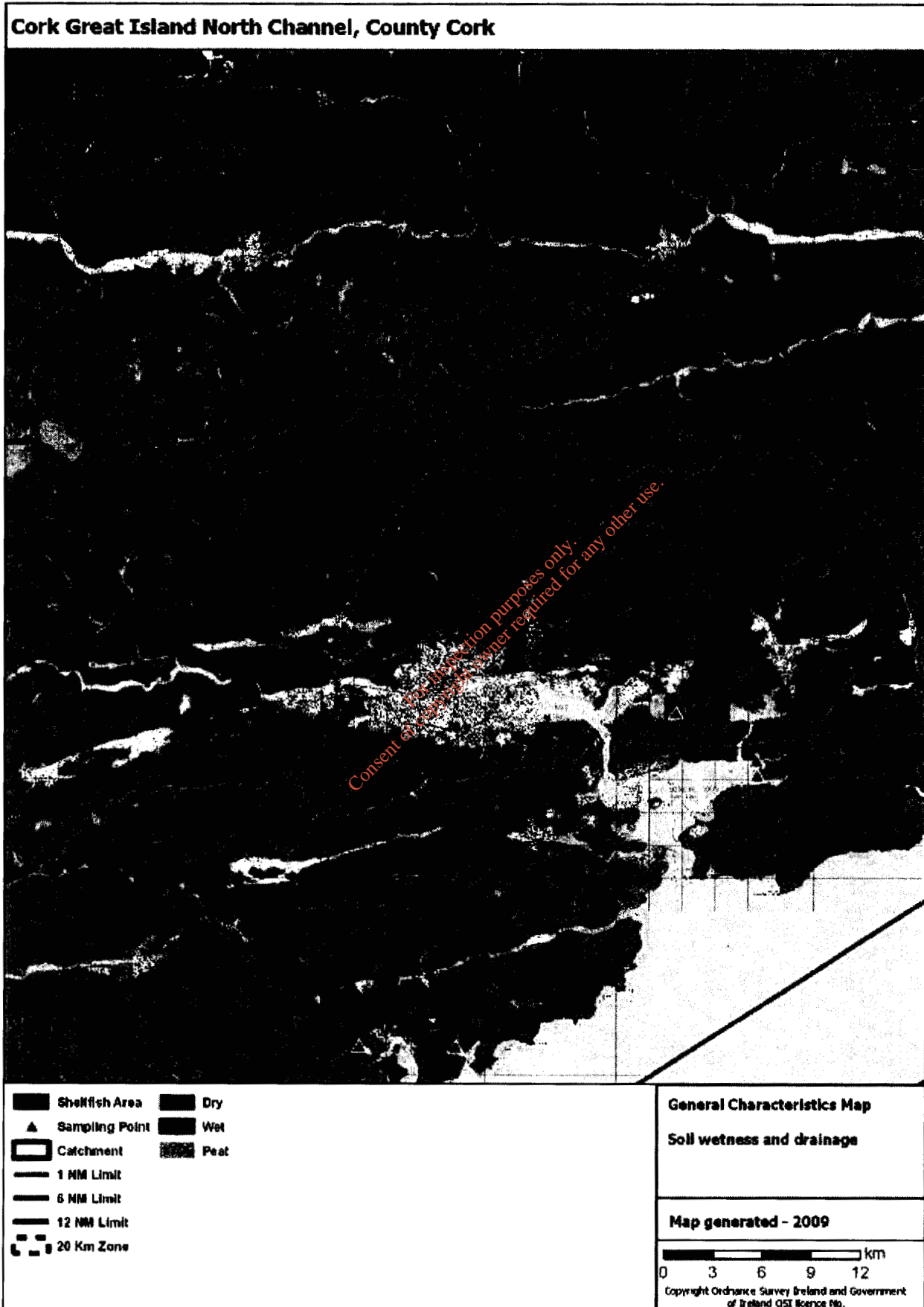
Cork Great Island North Channel, County Cork



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<ul style="list-style-type: none"> Shellfish Area Catchment 1 NM Limit 6 NM Limit 12 NM Limit 20 Km Zone 	<ul style="list-style-type: none"> — Rivers Lakes Marine waters 	<ul style="list-style-type: none"> 0 - 30m 30 - 60m 60 - 90m 90 - 120m 120 - 150m 150 - 200m 200 - 280m 280 - 370m 370 - 520m 520 - 1100m 	<p>General Characteristics Map</p> <p>Topography</p> <hr/> <p>Map generated - 2009</p> <p>0 6 12 18 24 km</p> <p><small>Copyright Ordnance Survey Ireland and Government of Ireland OSI licence No.</small></p>
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MAP 5 - Soil wetness

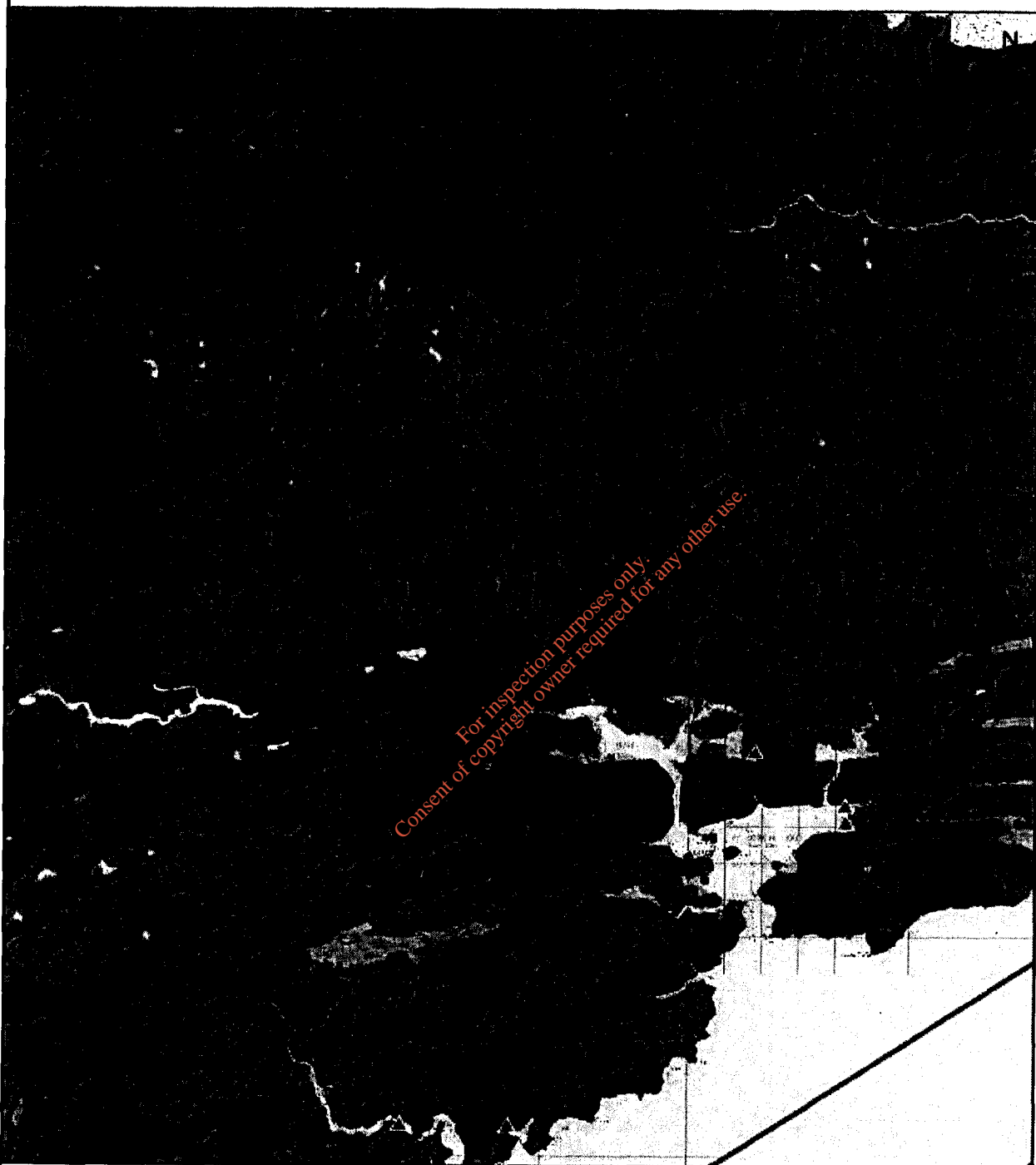


MAP 6 - Vulnerability of groundwater to pathogens from subsoil discharges



MAP 7 - Vulnerability of groundwater to phosphorus from subsoil discharges

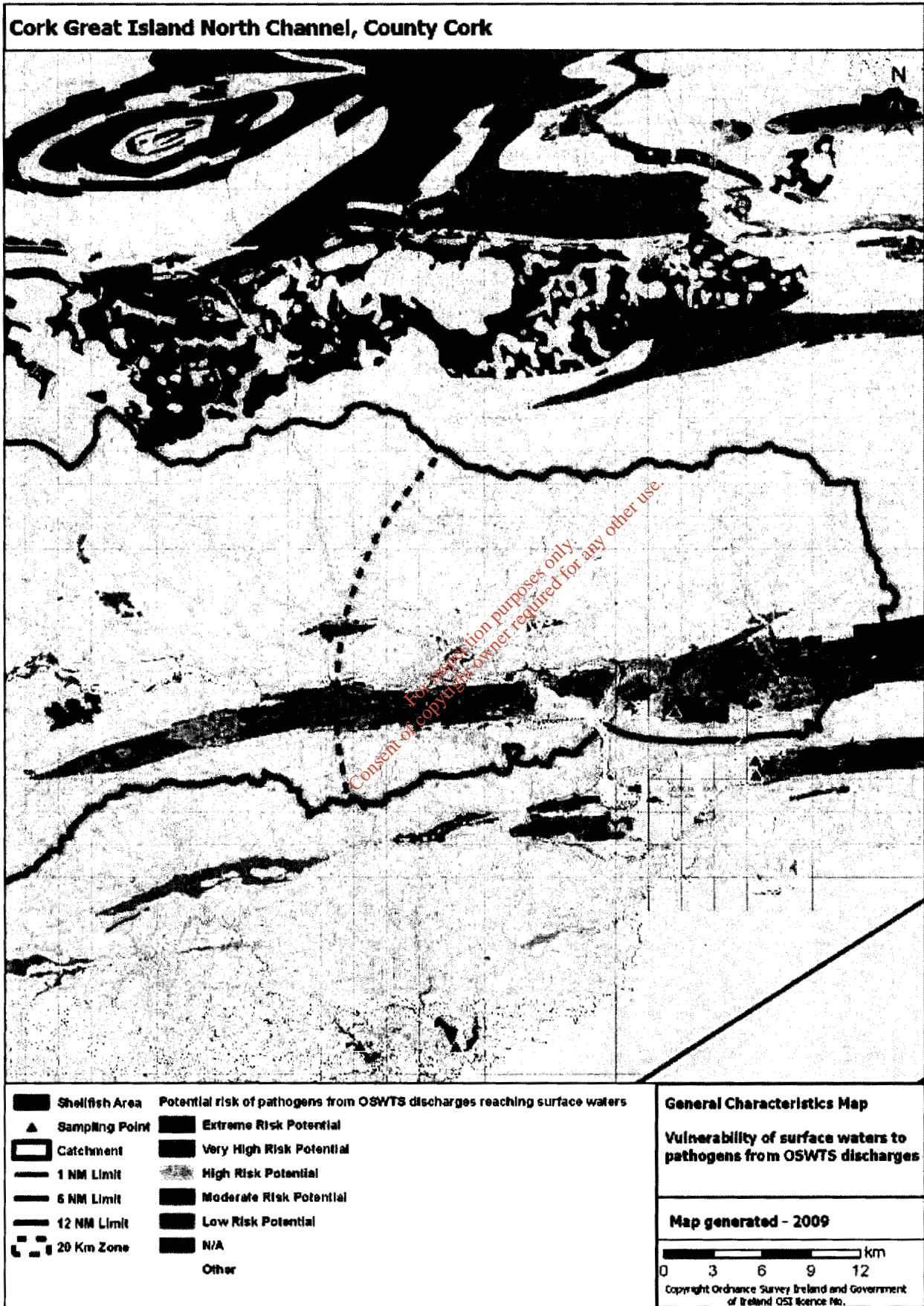
Cork Great Island North Channel, County Cork



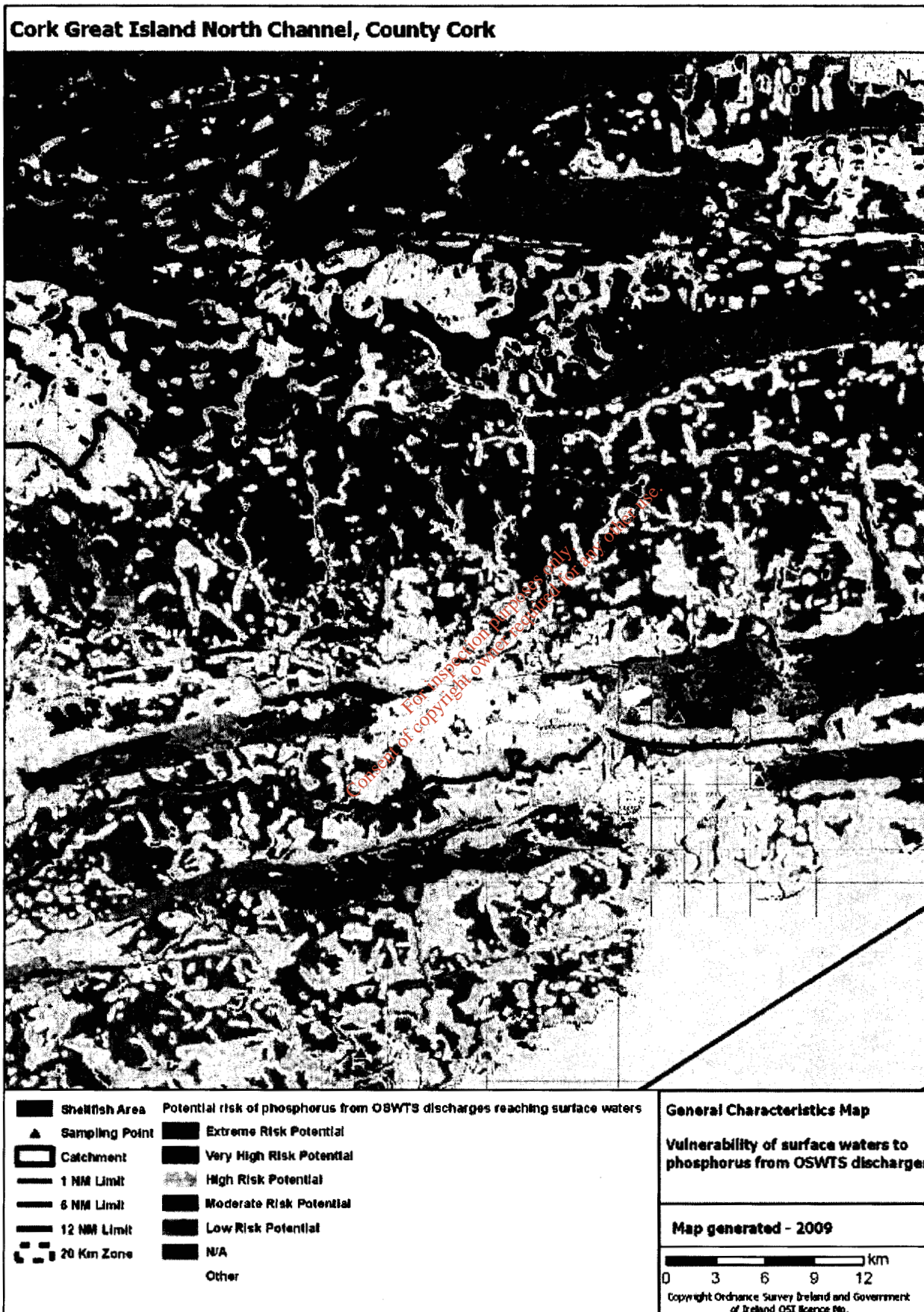
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<ul style="list-style-type: none"> Shellfish Area Sampling Point Catchment 1 NM Limit 6 NM Limit 12 NM Limit 20 Km Zone 	<p>Potential risk of phosphorus from OSWTS discharges reaching groundwaters</p> <ul style="list-style-type: none"> Extreme Risk Potential Very High Risk Potential High Risk Potential Moderate Risk Potential Low Risk Potential N/A Other 	<p>General Characteristics Map</p> <p>Vulnerability of groundwaters to phosphorus from OSWTS discharges</p> <hr/> <p>Map generated - 2009</p> <hr/> <p>0 3 6 9 12 km</p> <p>Copyright Ordnance Survey Ireland and Government of Ireland OSI licence No.</p>
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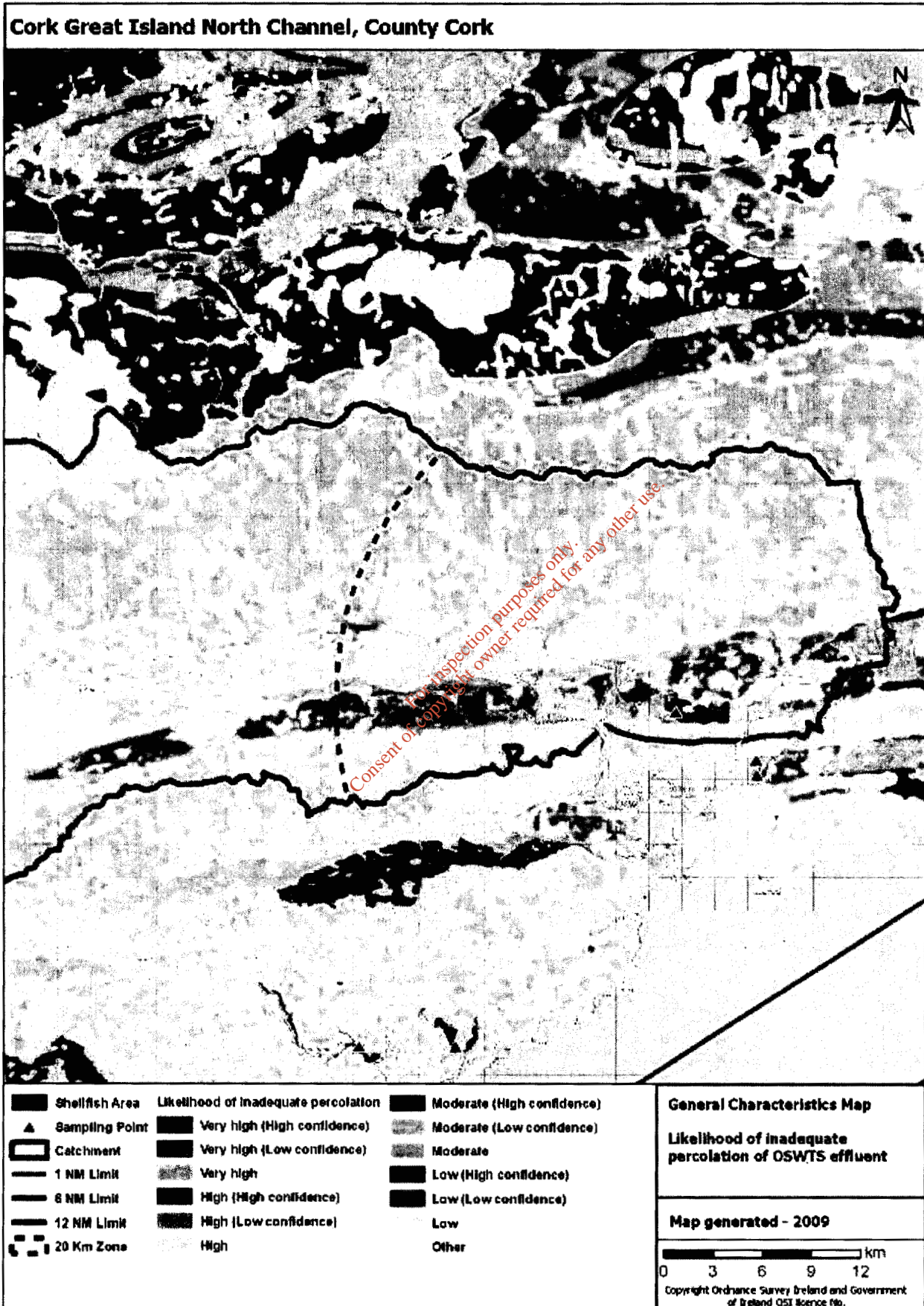
MAP 8 - Vulnerability of surface waters to pathogens from subsoil discharges



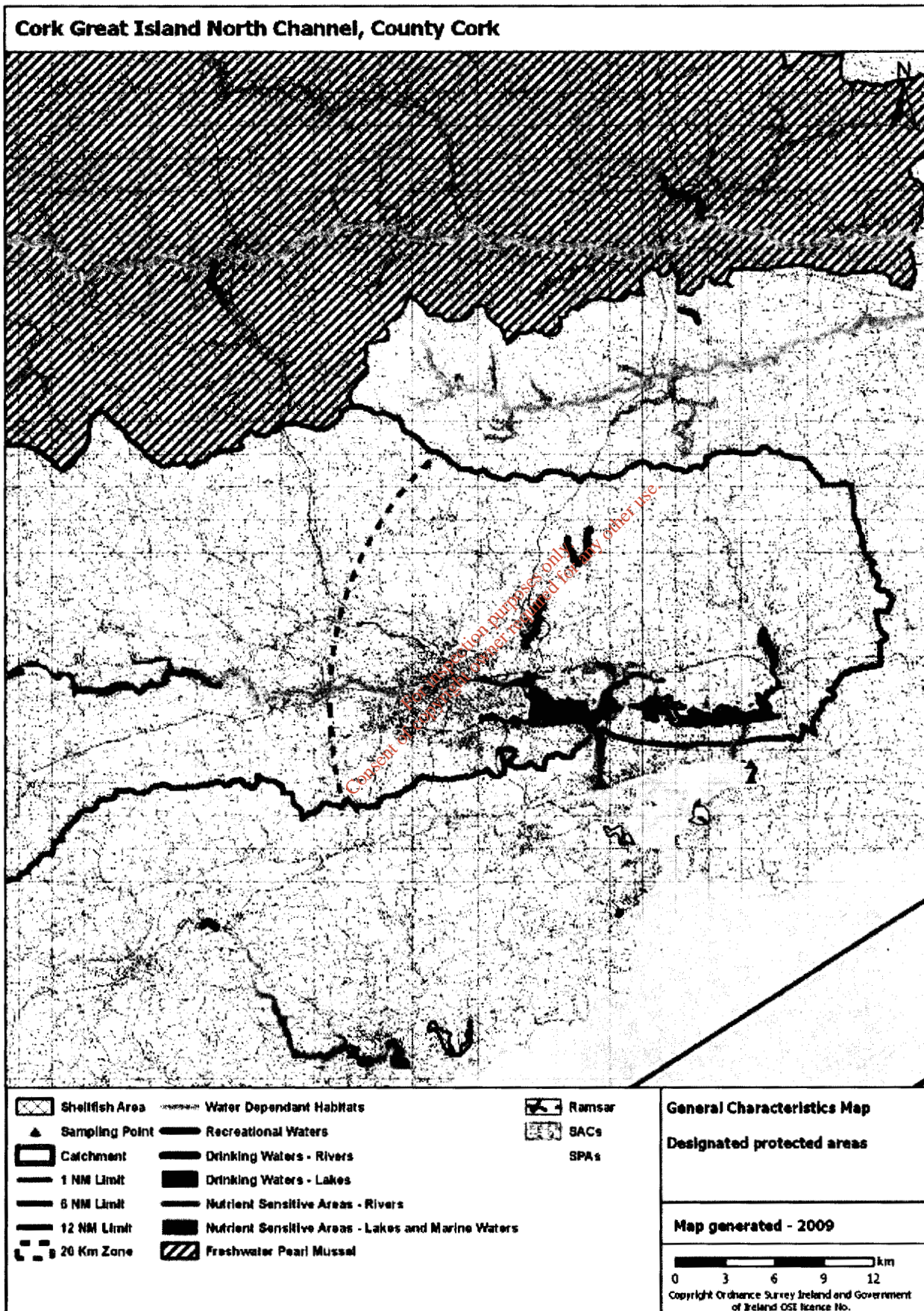
MAP 9 - Vulnerability of surface waters to phosphorus from subsoil discharges



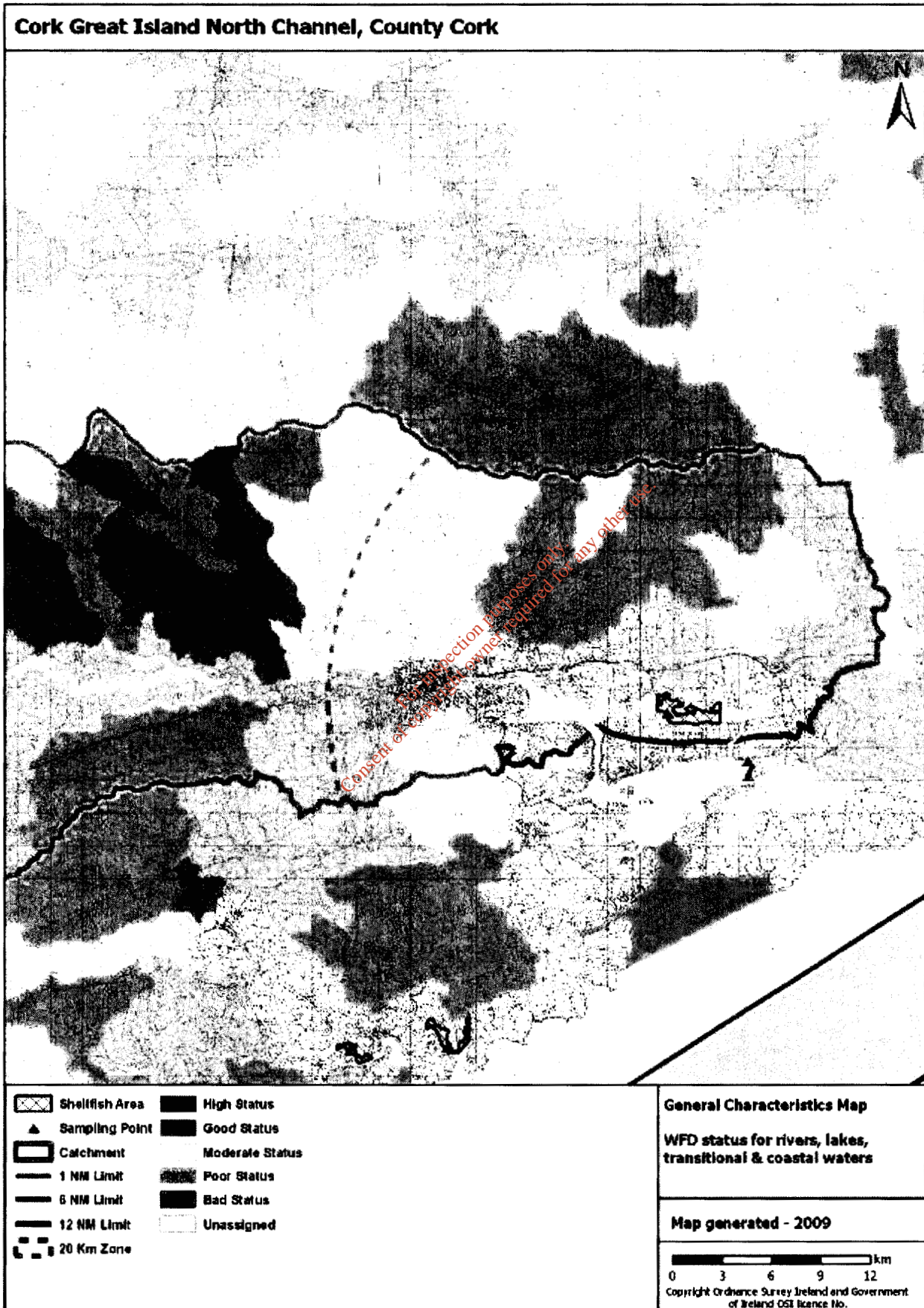
MAP 10 - Likelihood of inadequate percolation in sub-soils



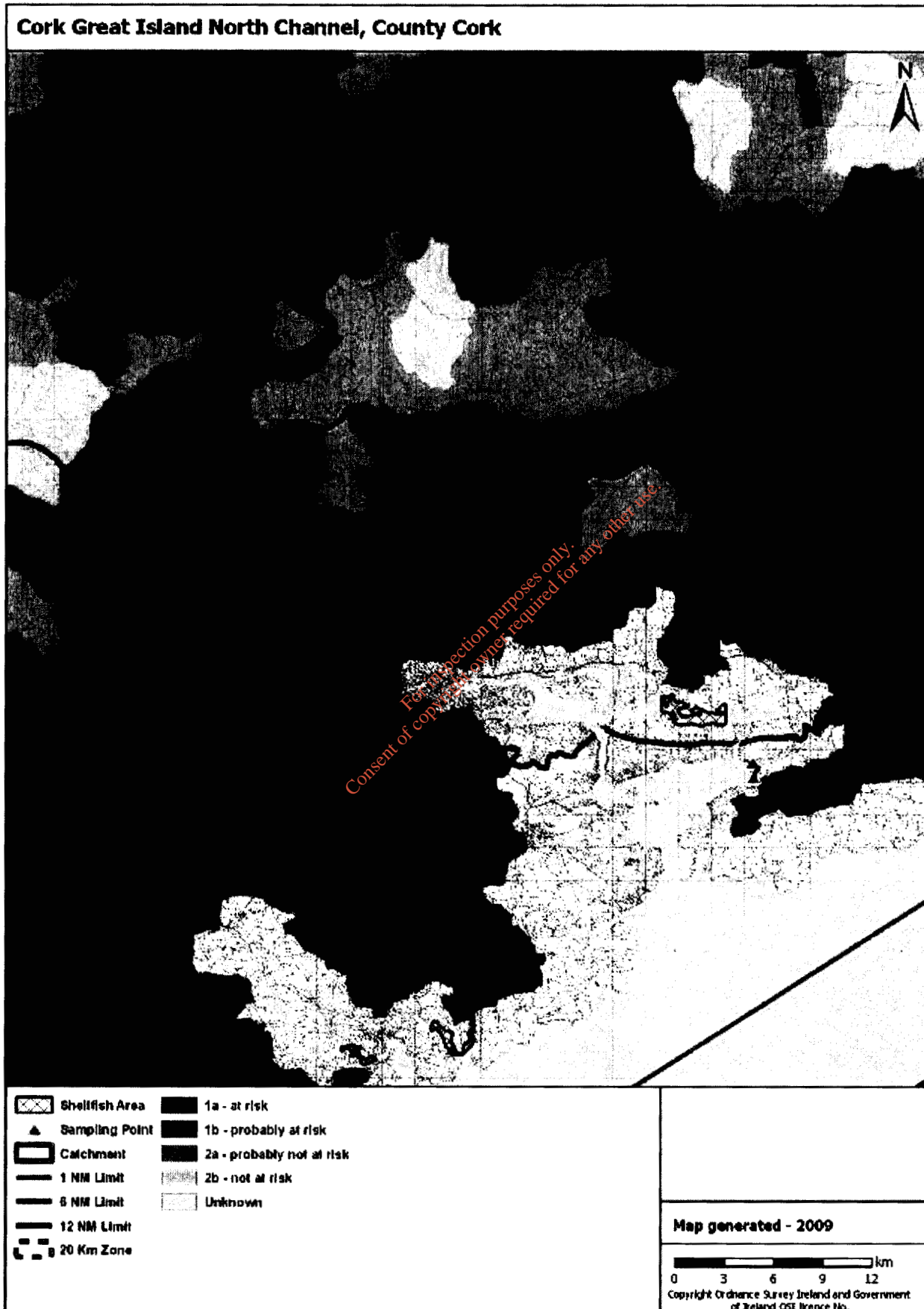
MAP 11 - Designated protected areas



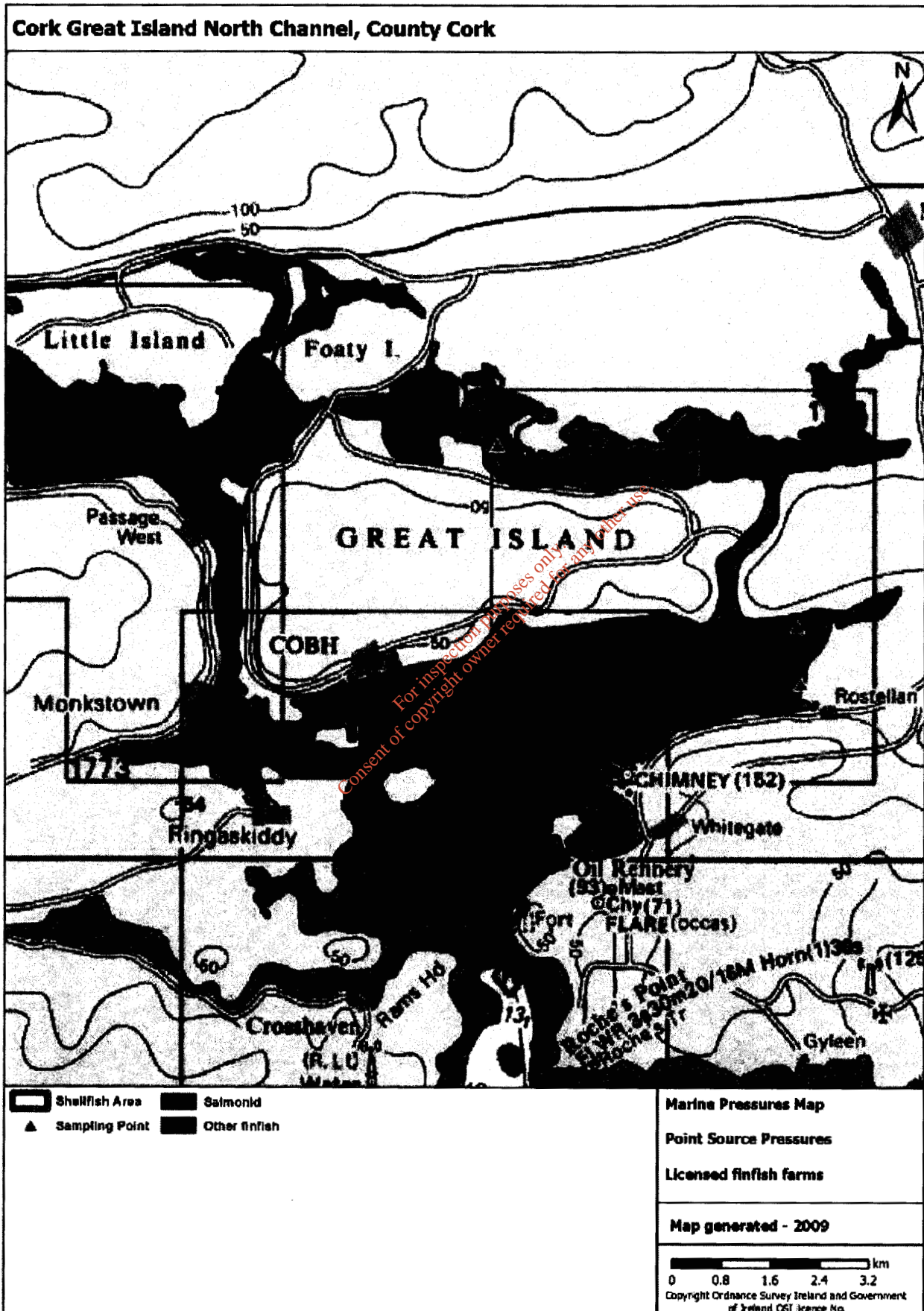
MAP 12 - WFD surface water status



MAP 13 - Diffuse risk assessment



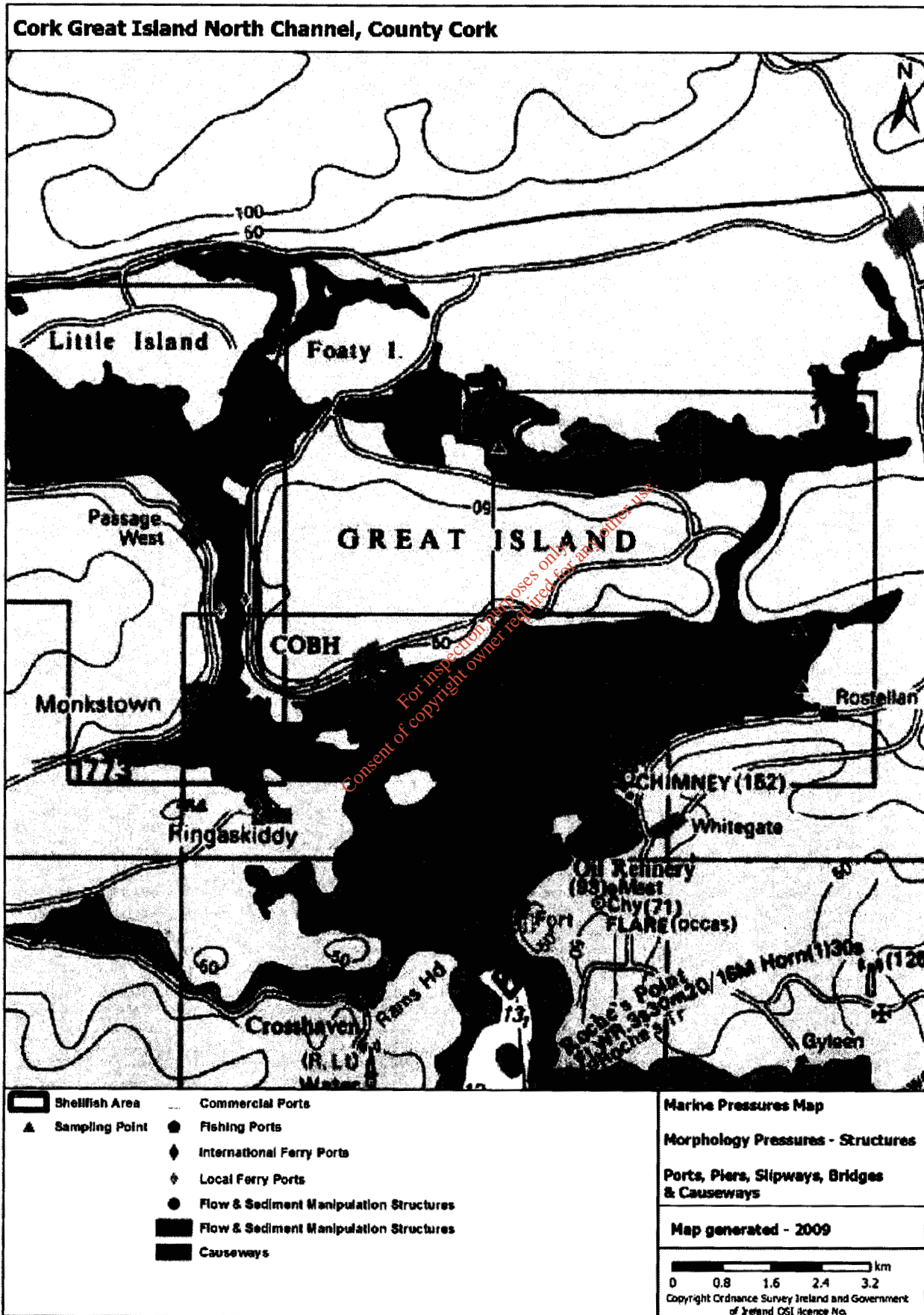
MAP 14 - Licensed finfish areas (None in the vicinity of this shellfish area)



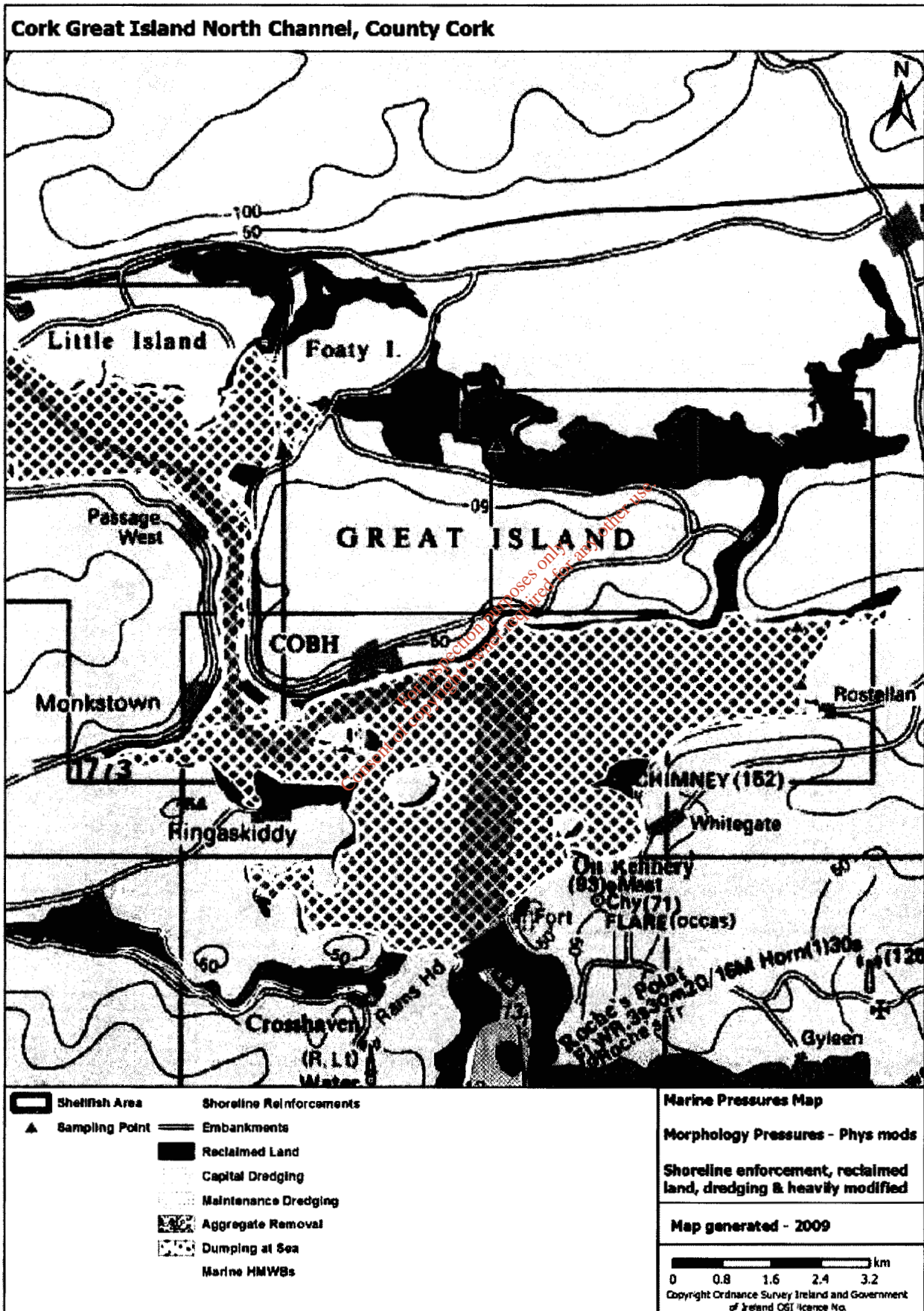
MAP 15 - Fishing gear activity



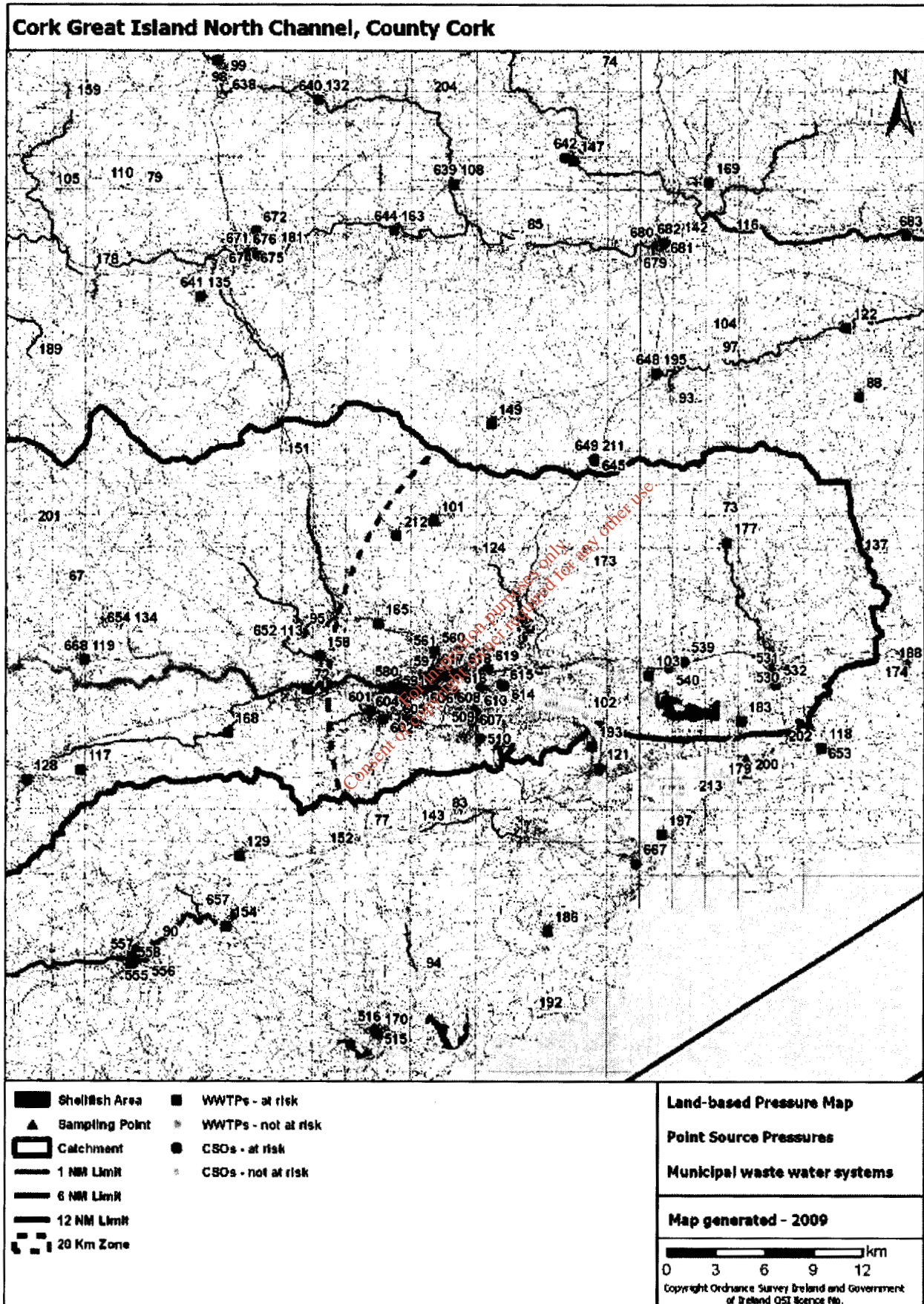
MAP 16 - Marine structures



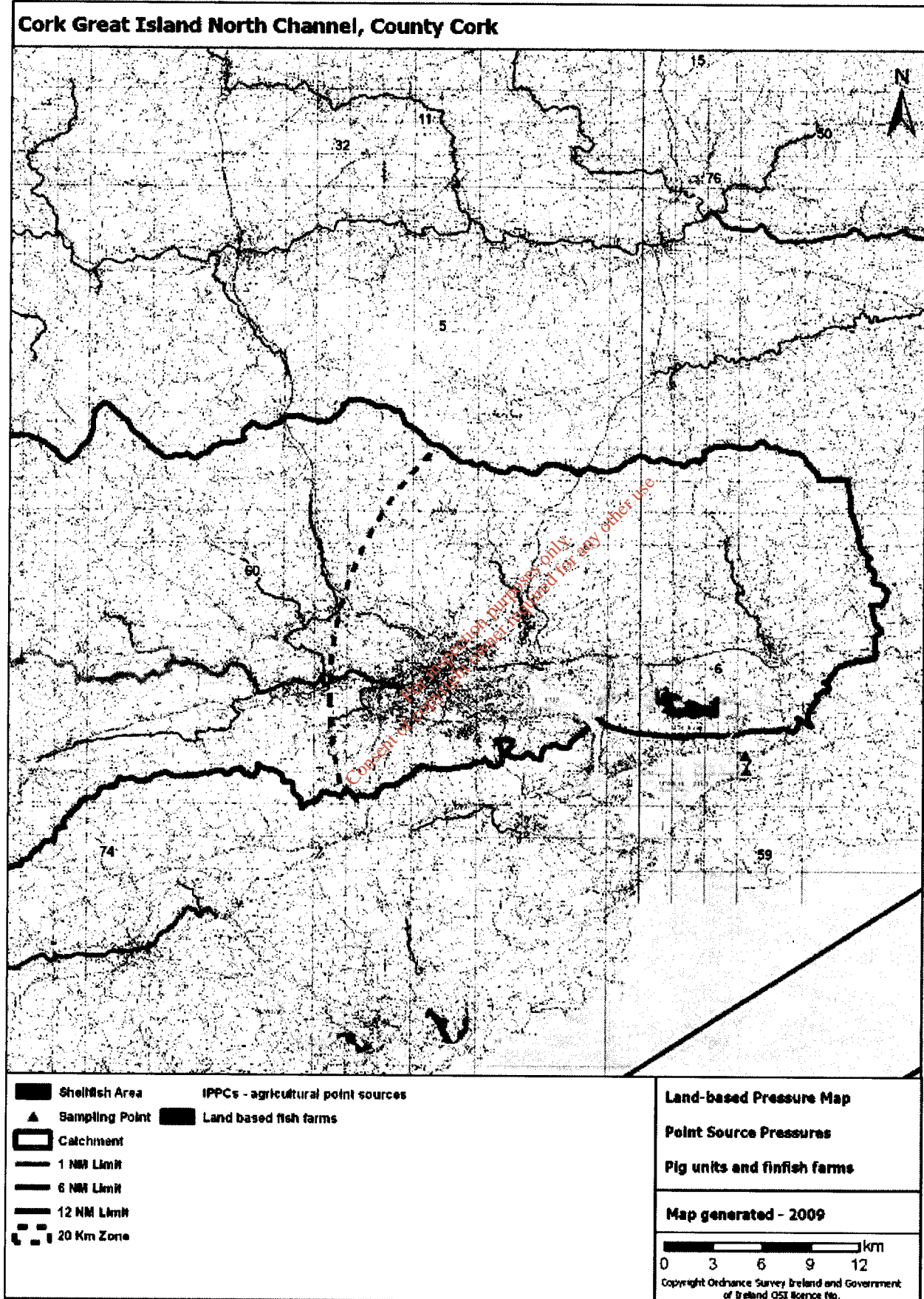
MAP 17 - Marine physical modifications



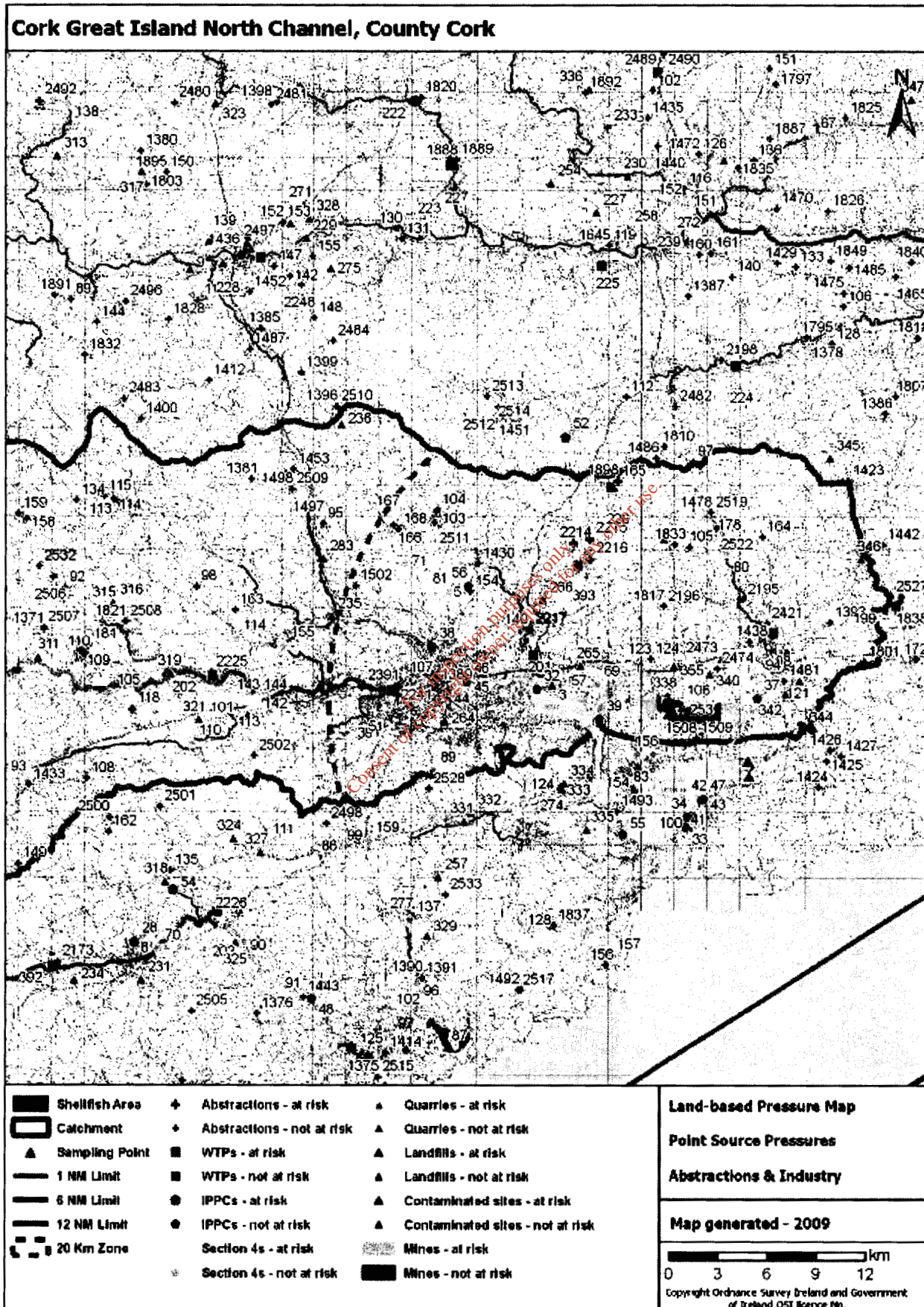
MAP 18 - Municipal waste water systems



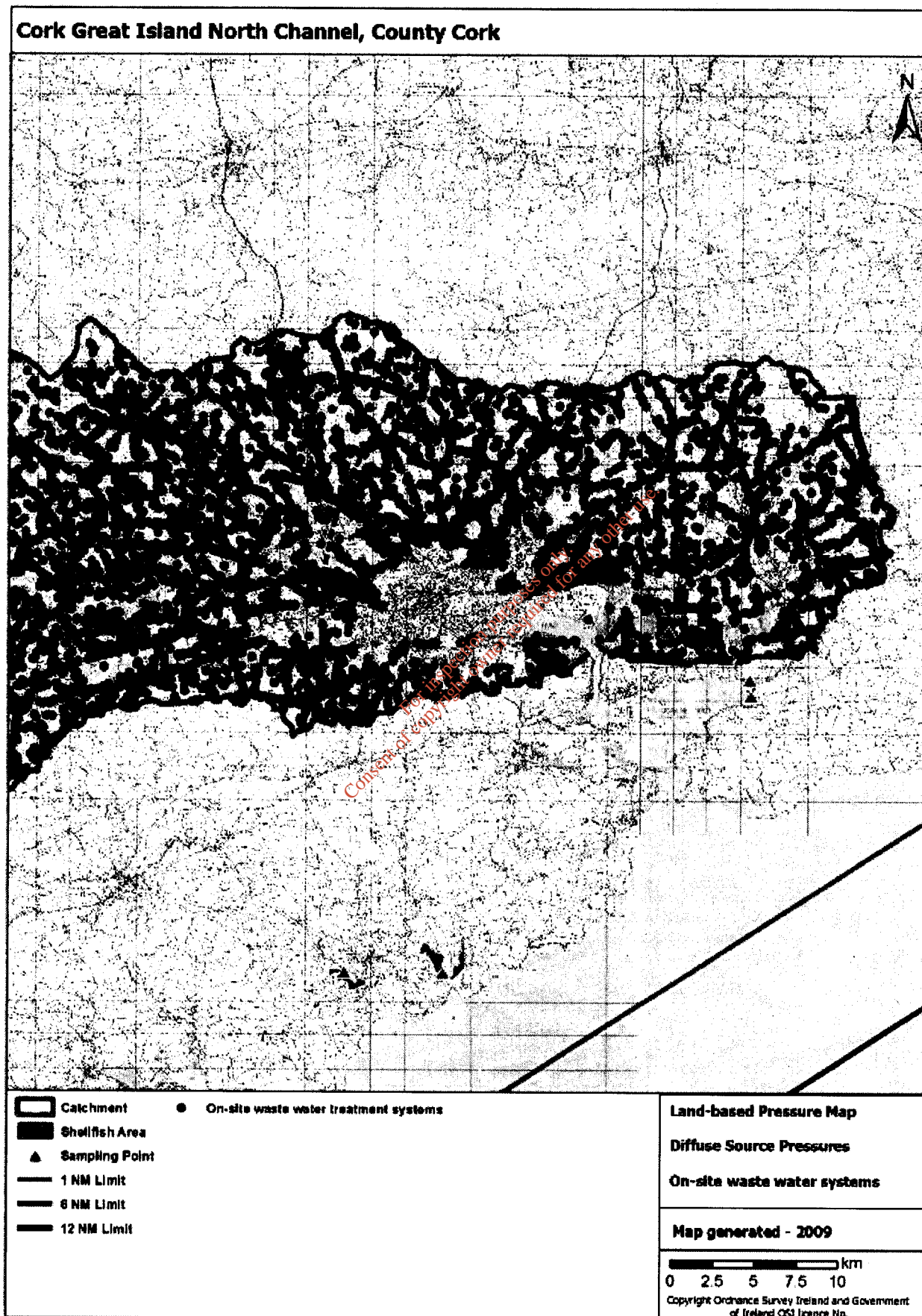
MAP 19 - Pig units and finfish farms



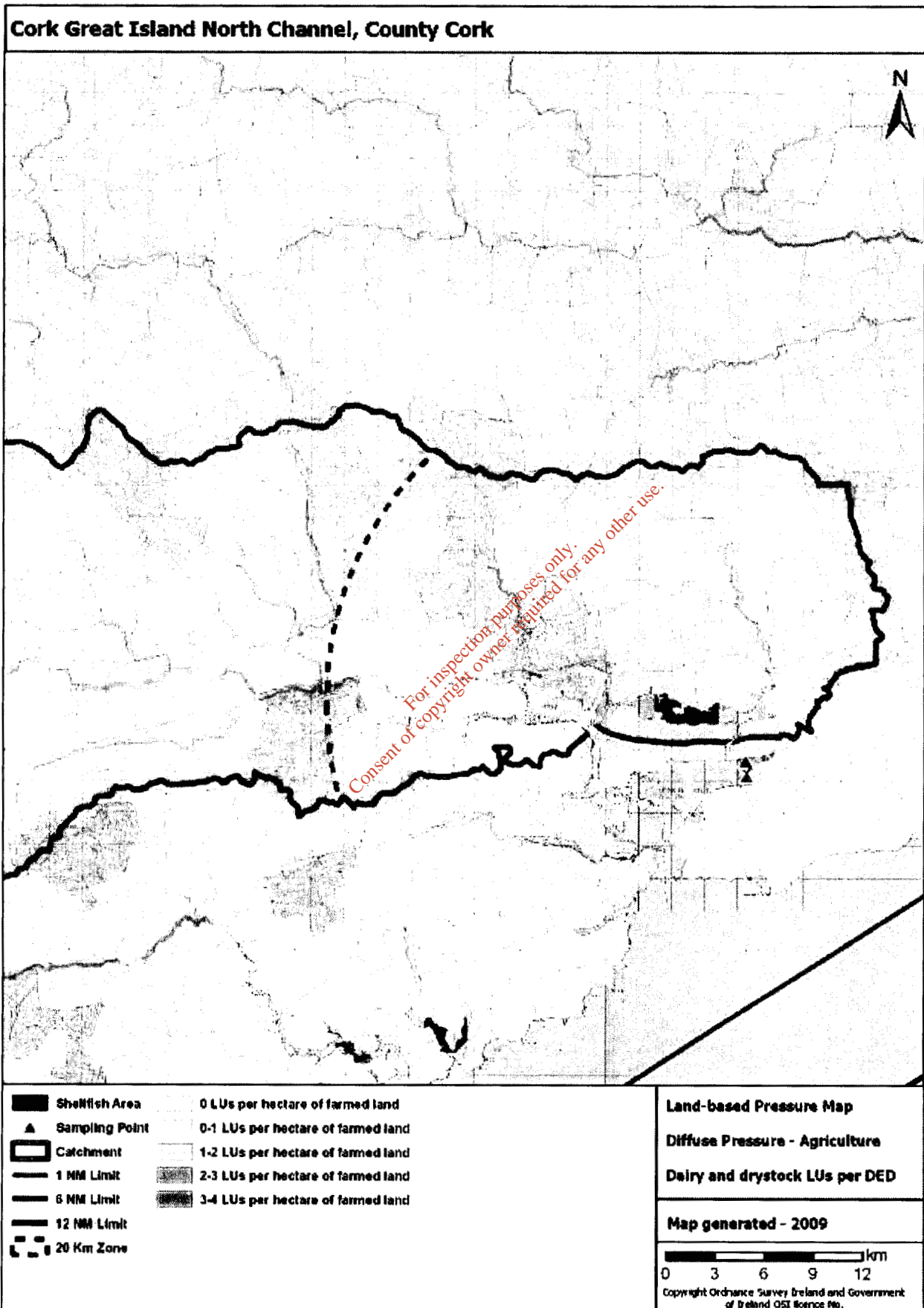
MAP 20 - Industrial point source pressures



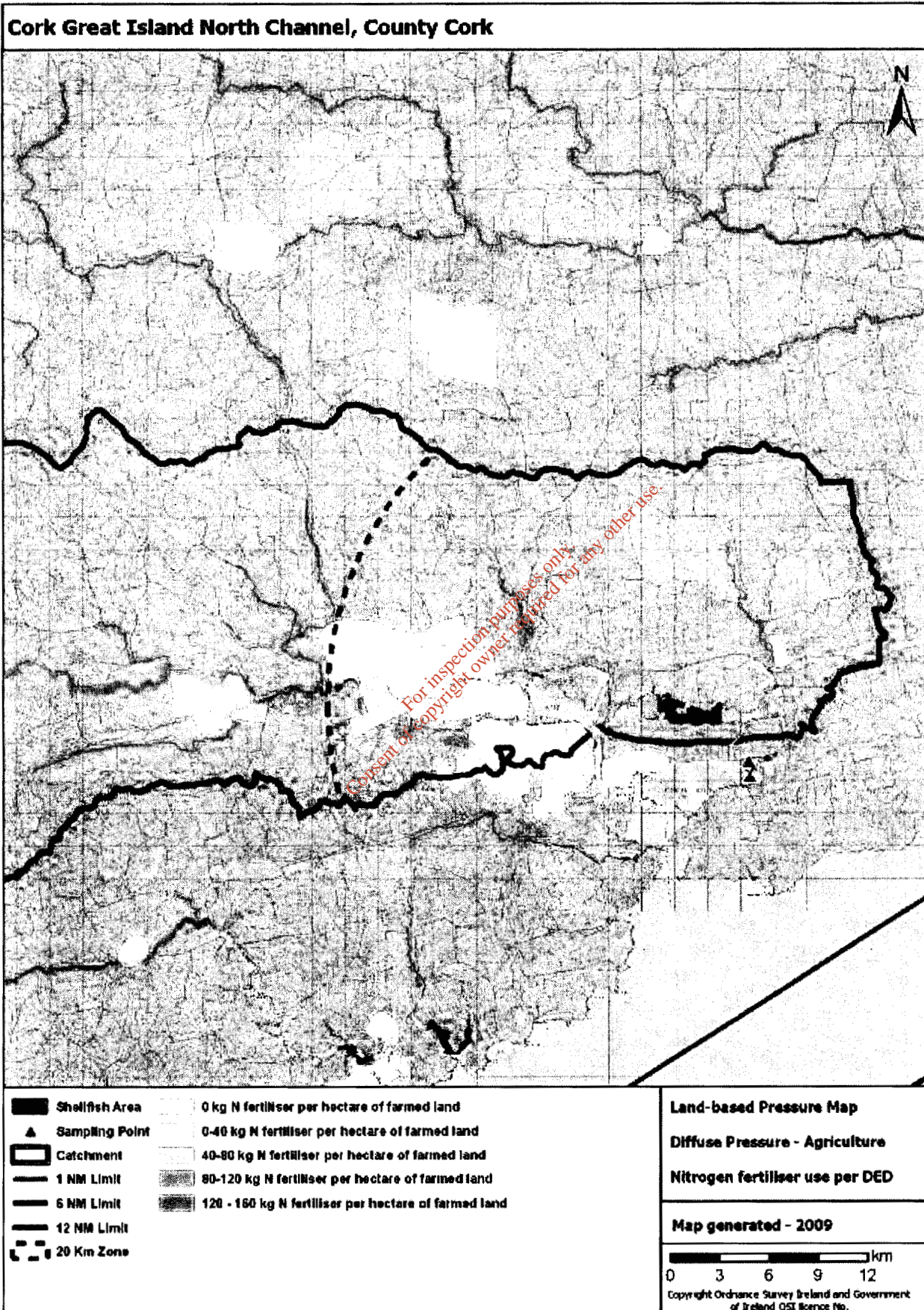
MAP 21 - On-site waste water systems



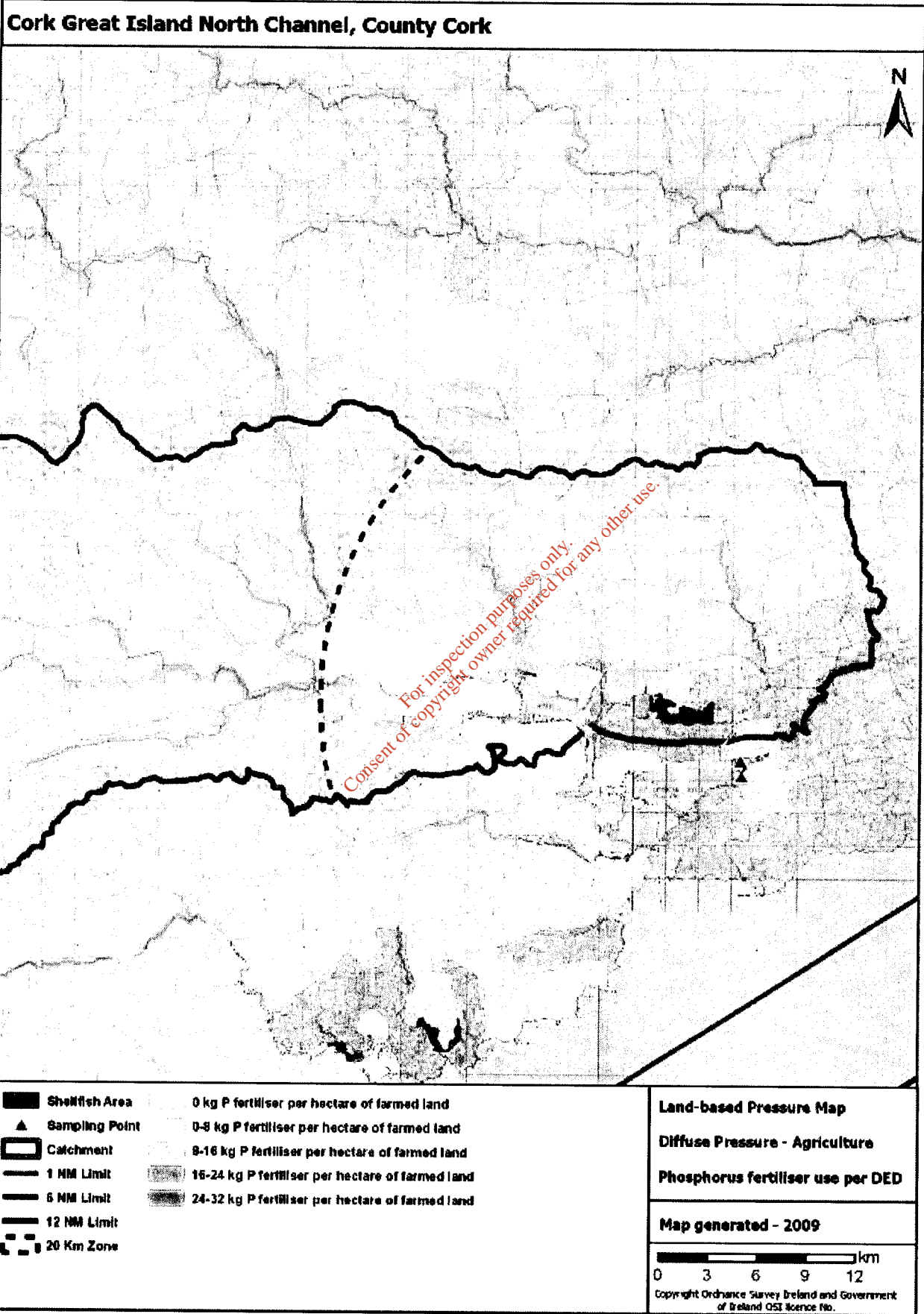
MAP 22 - Dairy and drystock livestock units



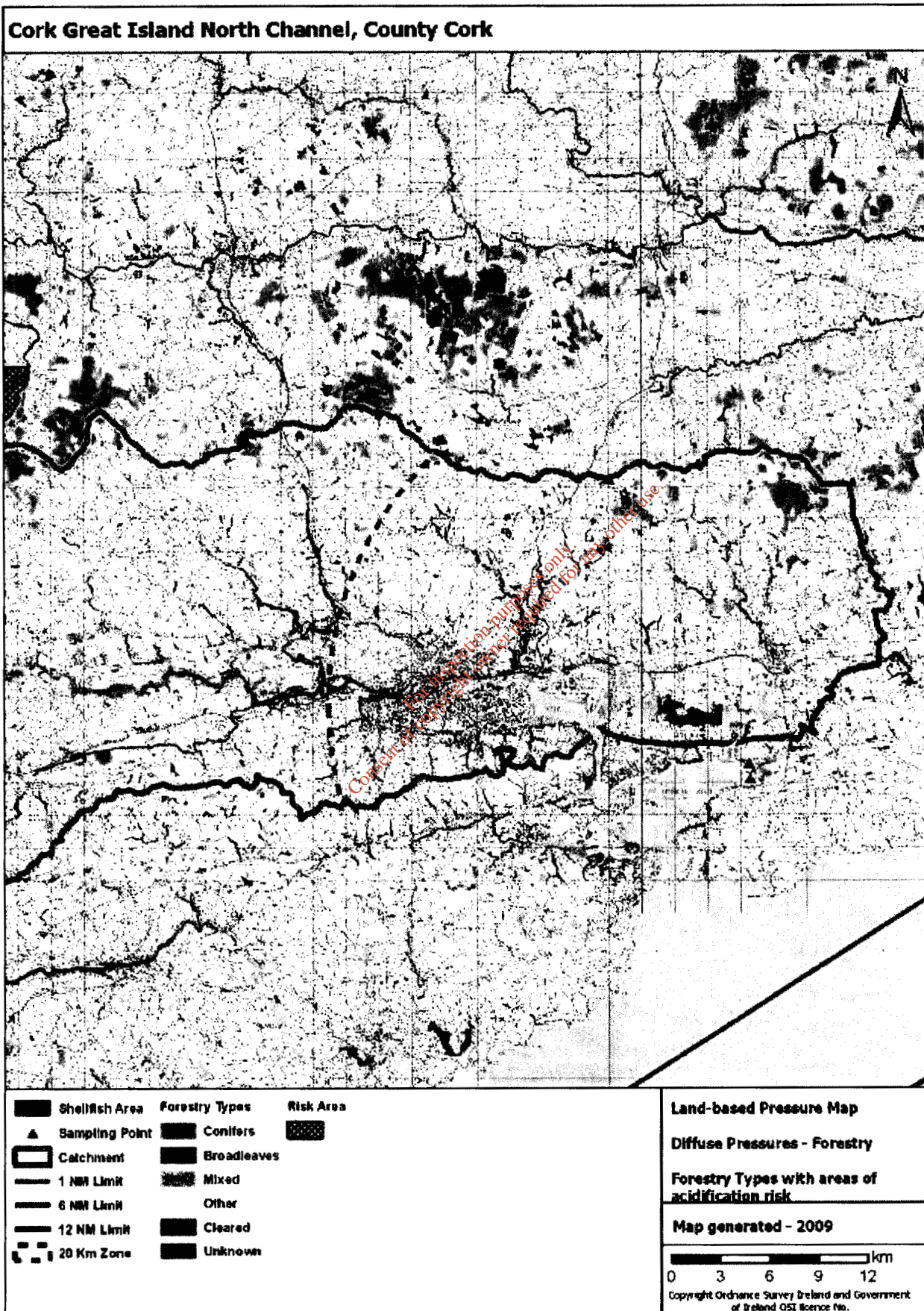
MAP 23 - Nitrogen fertiliser usage



MAP 24 - Phosphorus fertiliser usage

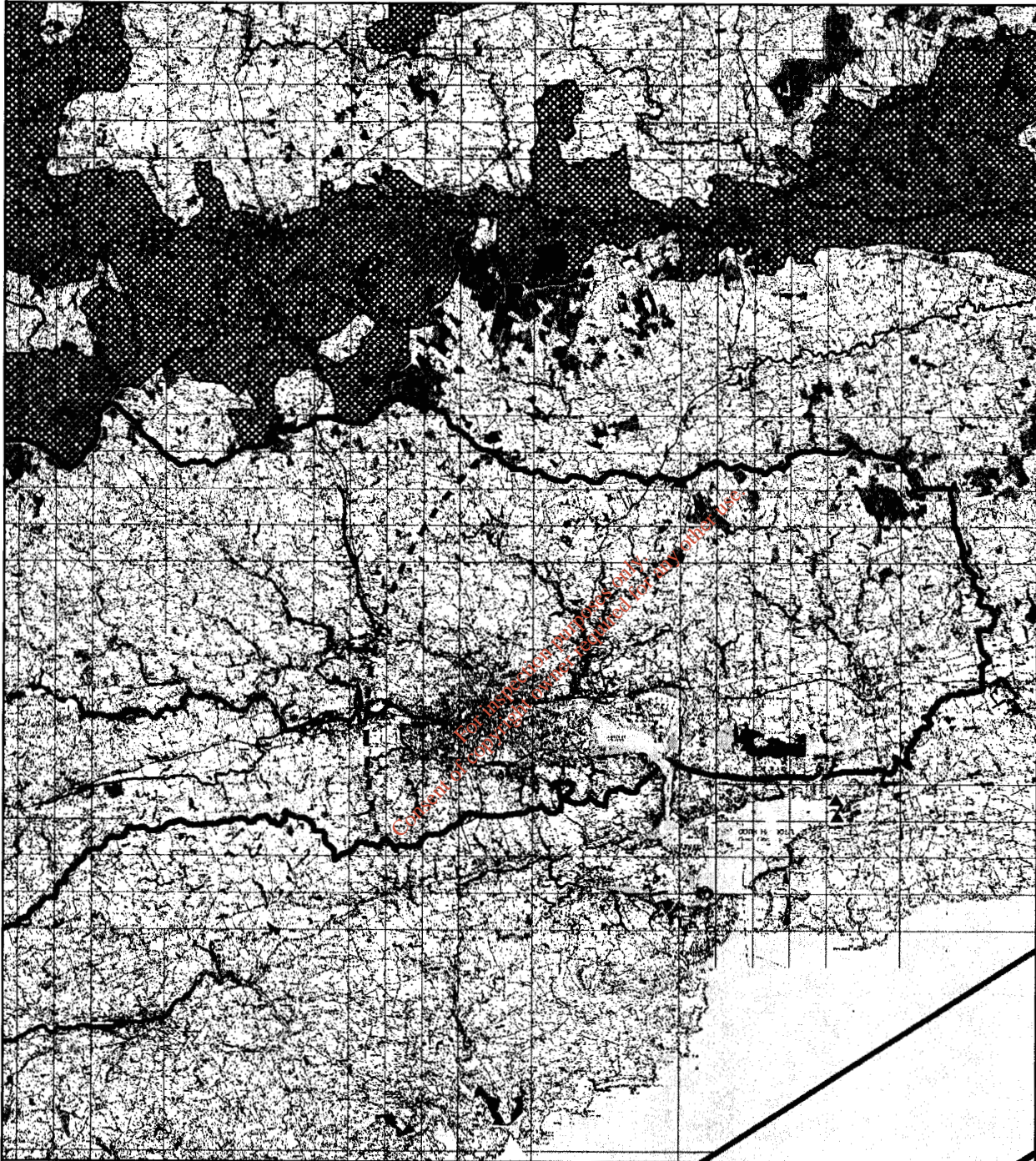


MAP 25 - Forestry types with acidification risk areas



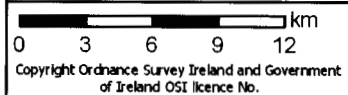
MAP 26 - Forestry types with eutrophication risk areas

Cork Great Island North Channel, County Cork

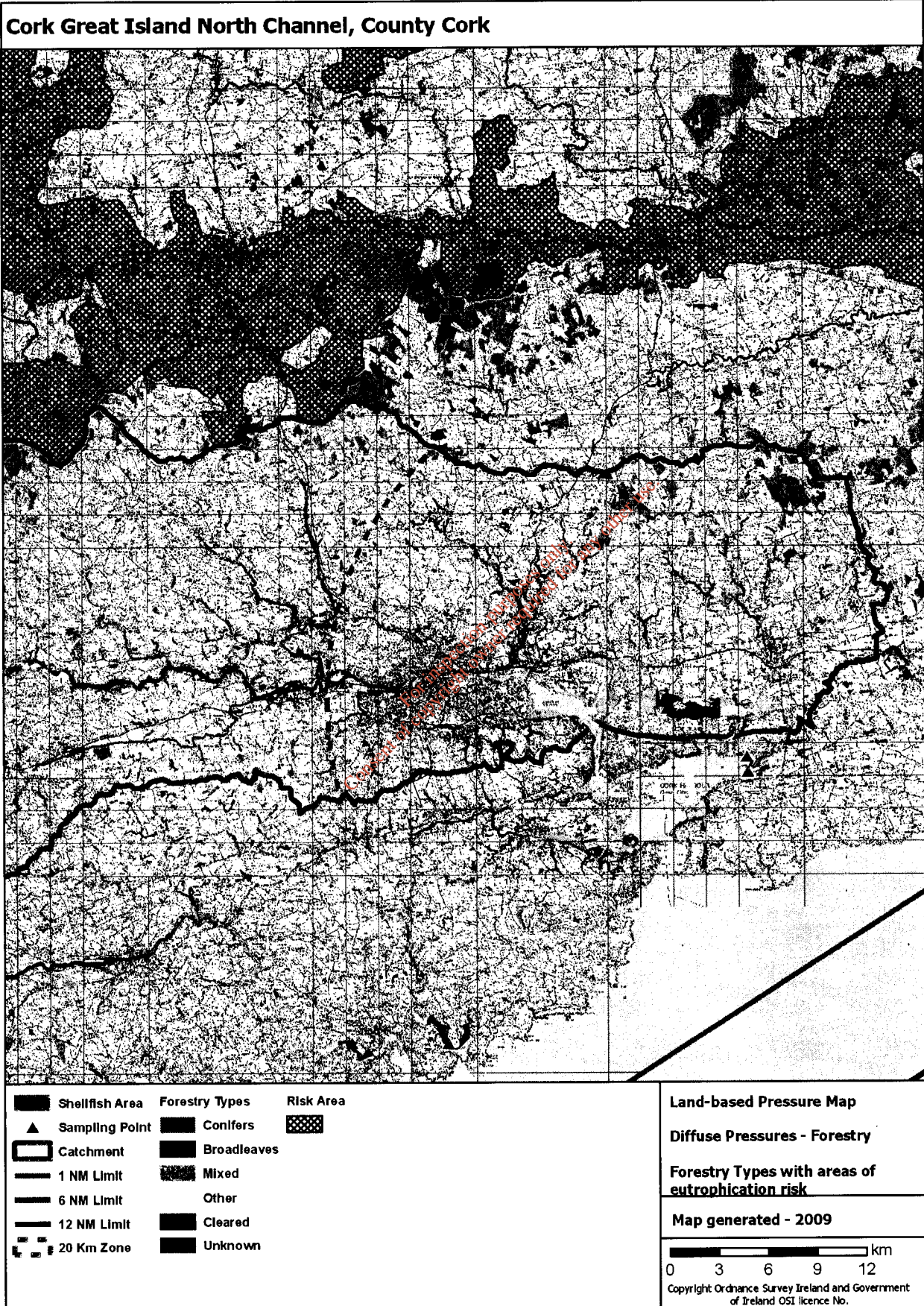


- | | | |
|----------------|-----------------------|-----------|
| Shellfish Area | Forestry Types | Risk Area |
| Sampling Point | Conifers | |
| Catchment | Broadleaves | |
| 1 NM Limit | Mixed | |
| 6 NM Limit | Other | |
| 12 NM Limit | Cleared | |
| 20 Km Zone | Unknown | |

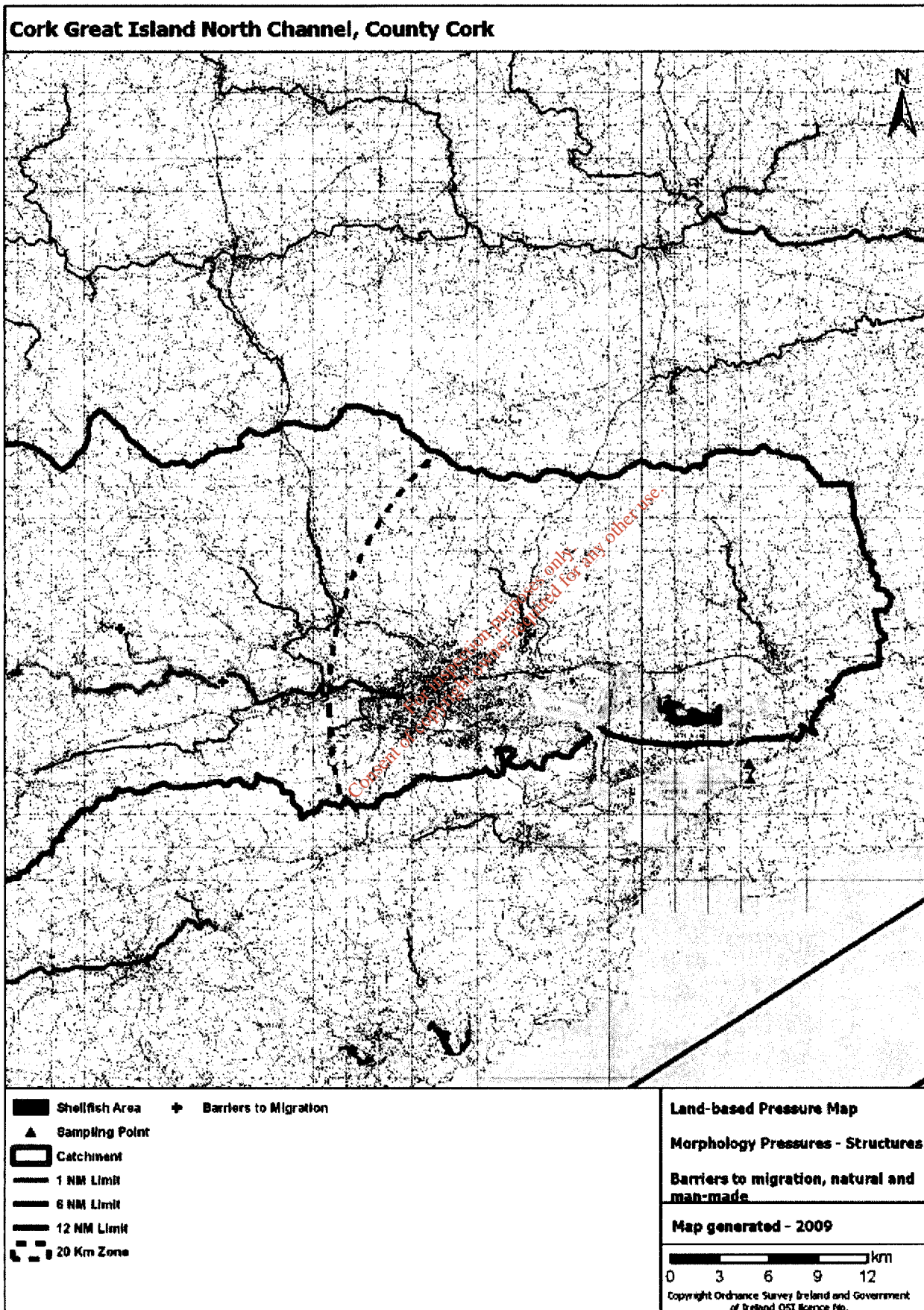
Land-based Pressure Map
Diffuse Pressures - Forestry
Forestry Types with areas of eutrophication risk
Map generated - 2009



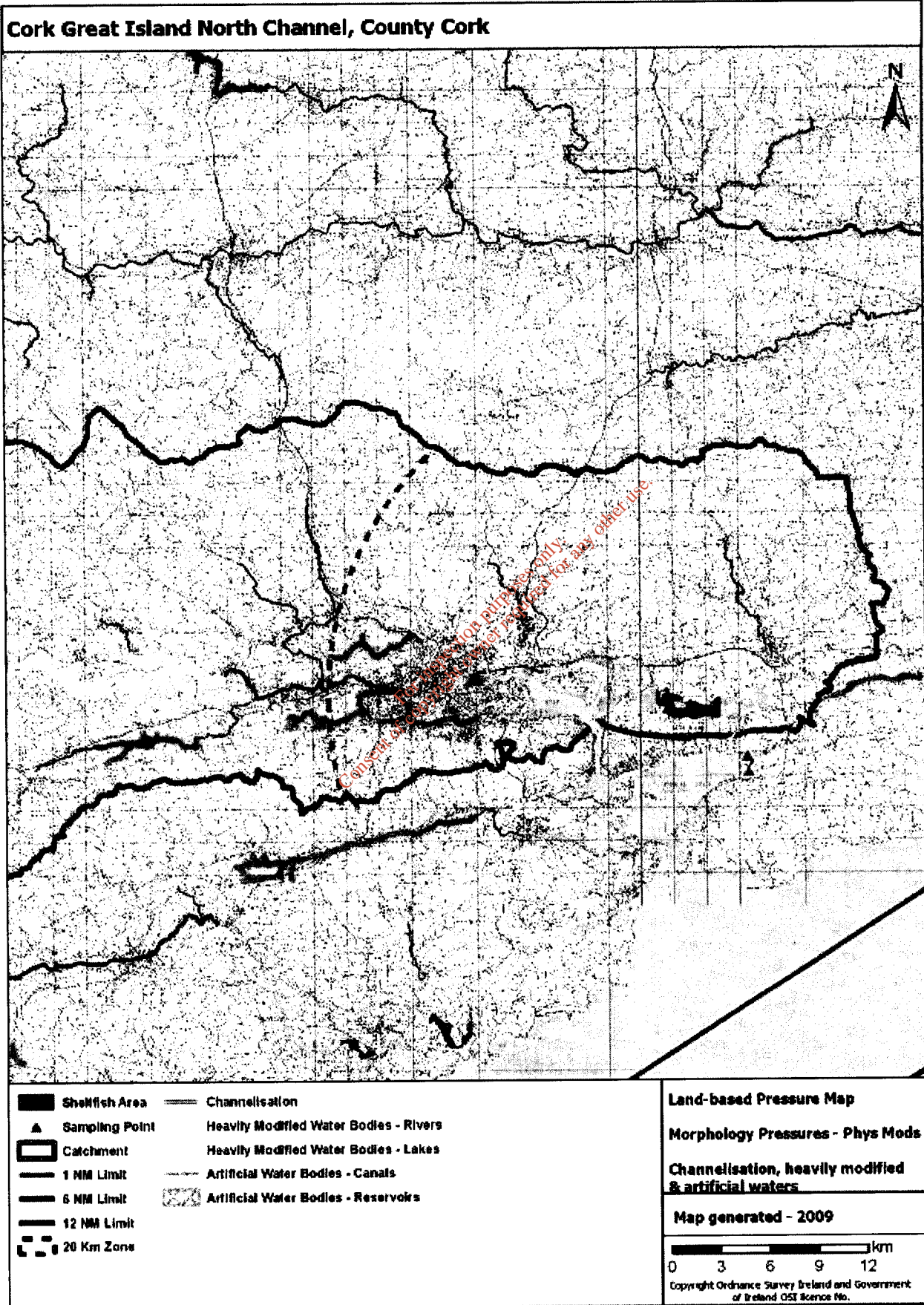
MAP 27 - Forestry types with sedimentation risk areas



MAP 28 - Freshwater structures (None in this catchment)



MAP 29 - Freshwater physical modifications



5.0 PRESSURES

This section of the characterisation report provides a tabular overview and inventory of the marine and land-based pressures in the vicinity of the designated shellfish area and within the contributing catchment up to a distance of 20 kilometres from the shellfish area. The pressure data has been derived from existing inventories. The pressures considered most likely to be related to any measured impacts on shellfish water quality parameters in this shellfish area have been estimated in order to focus management efforts towards the protection and improvement of the water quality in this shellfish area.

The available information considered when determining the likelihood of the pressures to cause impacts includes:

- pressure type

The pressure types, be it marine or land-based, point, diffuse or morphological, vary in terms of: their likelihood to impact on shellfish water quality; the water quality parameters they are likely to affect; and the severity of the impacts. The results of monitoring can therefore provide an indication of which pressure types are likely to be causing impacts.

- pressure magnitude

The magnitude of the pressures acting on a shellfish area can affect the overall potential impact. For marine pressures, the magnitude depends on the number and scale of the pressures but also on the exposure of the shellfish area to the pressures which in turn depends on how open or sheltered the shellfish area is and on water circulation. For land-based pressures, the magnitude depends on the number and scale of the pressures but also on the remoteness of the pressures from the shellfish areas which in turn depends on the distance of the pressures from the shellfish area, the topography of the catchment and the presence of lakes downstream of pressures which can act as pollution sinks.

- WFD risk designations

A series of risk assessments relating to the main pressures on waters were carried out during the WFD implementation process to identify pressures 'at risk' of impacting the surrounding water environment. These were originally carried out in 2004 and 2005 in accordance with Article V of the directive but many of them were subsequently updated in 2008 to feed into draft River Basin Management Plans. A lot of information about the pressures was collected to undertake these assessments and some of that information is summarised in this section where it is useful in screening which pressures are most likely to impact on shellfish water quality. In all cases, the most up-to-date risk assessment information available was used. Full details of the WFD risk assessments can be found at www.wfdireland.com.

Whilst the risk designations under the WFD provide a useful screening tool for pressures, their relevance in terms of any water quality issues measured in Shellfish Waters has to be assessed in further detail to identify key pressures at a particular site.

For example, the main issue to be addressed in the Cork Great Island North Channel Pollution Reduction Programme is microbial contamination of the shellfish growing waters. Available monitoring data does not suggest, for example, metal contamination of shellfish.

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Table 4 lists all of the pressures considered in the development of the characterisation report and indicates which of them are present either within the shellfish area, within the marine waters in the vicinity of the shellfish area or within the contributing catchment. Those pressures that are present are discussed later in this section.

TABLE 4 - Summary of pressures

Pressure type	Pressure type	Pressures	Present		
Marine	Point	Marine finfish farms	No		
	Morphology	Fishing gear activity	Yes		
		Structures and associated activities			
		Ports	No		
		Flow/Sediment manipulation structures	Yes		
		Piled structures	Yes		
		Causeways	Yes		
		Physical modifications			
		Shoreline reinforcement	Yes		
		Embankments	Yes		
		Reclaimed Land	Yes		
		Capital dredging	Yes		
		Maintenance dredging	Yes		
		Aggregate removal	No		
		Disposal at sea	No		
		Marine heavily modified waters	Yes		
		Land-based	Point	Municipal waste water systems	
				Urban waste water treatment systems	Yes
				Combined sewer overflows	Yes
				Agricultural and aquacultural point sources	
Pig units	Yes				
Freshwater finfish farms	No				
Industrial point sources					
Abstractions	Yes				
Water treatment plants	Yes				
IPPCs	Yes				
Section 4s	Yes				
Quarries	Yes				
Landfills	Yes				
Mines	No				
Contaminated lands	Yes				
Other (Oil terminal)	No				
Diffuse	On-site waste water treatment systems			Yes	
	Agriculture				
	Livestock density			Yes	
	Nitrogen fertiliser usage			Yes	
	Phosphorus fertiliser usage	Yes			
	Forestry	Yes			
	Morphology	Structures			
Barriers to migration		No			
Physical Modifications					
Channelisation		Yes			
Heavily modified waters		No			
Artificial waters		No			

5.1 Marine Pressures

Marine pressures are considered up to a distance of 5 kilometres from the shellfish area. Marine pressures situated further away or in adjacent waterbodies are also mentioned if they are considered significant. Marine pressure types include point source pressures (marine finfish farms) and morphological pressures including fishing gear activity, structures (ports, bridges, piers, slipways etc) and physical modifications (shoreline reinforcement, embankments, dredging etc). The potential impacts associated with these pressures are as follows:

- Point source pressures

Marine finfish farms can be associated with increased nutrient levels in waters, arising from fish excretion and excess feed input.

- Morphological pressures

Fishing activity can be associated with increased suspended sediment levels arising from disturbance of the seabed. The potential severity of the impacts varies depending on the type of fishing gear used and the extent, frequency and duration of the activity. The impact of boats is dealt with in association with marine structures.

Structures (such as ports, harbours, bridges, slipways and piers) alter natural processes such as flow and silt movement and can therefore affect levels of suspended sediment in marine waters. The activities associated with these structures, for example shipping and boating, are associated with effects on the levels of general physico-chemical parameters, faecal coliforms, metals and chemicals.

Physical modifications (such as shoreline reinforcement, embankments and dredging) can alter natural processes such as flow and silt movement and can therefore affect levels of suspended sediment. However, once these modifications are established or the activities have ceased, the surrounding environment can acclimatise and impacts do not necessarily continue.

The following tables summarise the nature and extent of marine pressures up to a distance of 5 kilometres from the designated shellfish area. The likelihood for these pressures to impact on shellfish water quality parameters is discussed. The potential severity of the impacts of marine pressures is most closely associated with the activity type, magnitude and proximity and therefore the discussions in this section focus on these factors.

5.1.1 Point source pressures

There are no marine point source pressures in the vicinity of this designated shellfish area.

5.1.2 Morphology pressures

An assessment of the risk posed to marine waters from marine morphology pressures was carried out during the WFD implementation process. The results of this

assessment show that the marine waters in and around this shellfish area are considered to be 'not at risk' from morphological pressures.

Fishing gear activity

TABLE 5 - Fishing gears

Fishing gear types	Type	Present	Comment
Pots	Static	No	NA
Tangle Nets	Static	No	NA
Bottom Set Gill Nets	Static	No	NA
Draft Nets	Static	No	NA
Drift Nets	Static	No	NA
Line Fishing	Static	Yes	Widespread throughout the area
Box Dredge	Mobile	No	NA
Cockle Dredge	Mobile	No	NA
Hydraulic Dredge	Mobile	No	NA
Scallop Dredge	Mobile	No	NA
Oyster Dredge	Mobile	No	NA
Otter Trawl	Mobile	No	NA
Beam Trawl	Mobile	No	NA
Digging	NA	No	NA
Gathering	NA	No	NA
Rake	NA	No	NA

Table 5 provides a summary of the fishing gear activity occurring within 5 kilometres of the designated shellfish area. Map 15 illustrates these pressures. Boat movements are dealt with in association with marine structures such as ports and piers.

Static fishing gear types generally would not be expected to impact on shellfish water quality. Mobile fishing gears however disturb the seabed and can therefore affect the levels of suspended sediments in marine waters with the severity of the impacts depending on the frequency, intensity and extent of the fishing activity.

The only fishing gear activity in the vicinity of the shellfish area is widespread line fishing (lines set on the seabed with baited hooks at intervals), a static fishing gear type, and therefore fishing activity is unlikely to affect shellfish water quality in this shellfish area.

Structures and associated activities

TABLE 6 - Marine morphology structures

Marine morphology structures	Direct	0-5km	Comment
Ports	0	0	NA
Flow and sediment manipulation	1	21	Piers
Piled structures	0	10	NA
Causeways	0	2	NA

Table 6 provides a summary of the marine morphology structures located within 5 kilometres of the designated shellfish area. Map 16 illustrates these pressures. Flow and sediment manipulation structures include piers, breakwaters, groynes, flow deflectors and training walls. Piled structures include bridge and pier supports and

wind turbines. Causeways include roads and railway lines. These structures affect flow and sediment movement and can therefore impact on levels of suspended sediments, though these impacts can settle down once the structures are well established in an area. The activities associated with marine structures, including shipping and boating, can affect a wide range of water quality parameters including general physico-chemical parameters such as suspended sediment, dissolved oxygen and nutrient levels. Faecal coliform levels can also be affected as well as the levels of harmful substances such as metals and pesticides. Boat movements can lead to erosion and sedimentation effects as well as pollution from fuels.

There is 1 pier structure directly adjacent to the shellfish area and 21 additional pier structures, 10 piled structures and 2 causeways within 5 kilometres of the shellfish area. Port of Cork, one of Ireland's largest ports, and the principal port on the south coast, is situated approximately 10 kilometres to the west of the shellfish area. Its facilities include the City Quays, the Tivoli Industrial and Dock Estate, the Ringaskiddy Deepwater and Ferry Terminals and the Cobh Cruise Terminal.

The Cork Harbour/Great Island/North Channel complex is enclosed and sheltered and encompasses several islands with narrow channels between them. Due to this morphology, many of the structures listed here have little or no connection to the shellfish area despite their proximity (Map 16).

Monitoring in the area does not highlight any water quality issues which are likely to result from the structures themselves and the WFD risk assessment has deemed the area to be 'not at risk' from morphological pressures. Therefore, the marine structures themselves are unlikely to be affecting shellfish water quality in this shellfish area. However, shellfish flesh monitoring indicates faecal contamination in this shellfish area and WFD monitoring indicates issues with nutrient and DO levels. The activities associated with the structures could be a possible source of these water quality issues and therefore these activities could possibly be affecting shellfish water quality in this shellfish area.

Physical modifications

TABLE 7 - Physical modifications

Physical modifications	Direct	0-5 km	Comment
Shoreline reinforcement	0	117	Sea walls, revetments
Embankments	0	12	NA
Reclaimed land	0	12	Cork Harbour, Lough Mahon
Capital dredging	0	2	Cork Harbour
Maintenance dredging	0	2	Shipping Channels
Aggregate removal	0	0	NA
Dumping at sea	0	0	NA

Table 7 provides a summary of the physical modifications occurring within 5 kilometres of the designated shellfish area. Map 17 illustrates these pressures. These modifications can affect flow and sediment movement though these impacts can cease once the modifications are established.

There are no physical modifications in the direct vicinity of this shellfish area but there are 117 instances of shoreline reinforcement, 12 embankments, 12 areas of reclaimed land as well as areas of capital and maintenance dredging within 5 kilometres of the shellfish area. As above, many of these modifications have little or no connection to the shellfish area due to the enclosed and sheltered nature of this area. Monitoring in the area does not highlight any water quality issues which are likely to result from these modifications and the WFD risk assessment has deemed the area to be 'not at risk' from morphological pressures. Therefore, these modifications are unlikely to affect shellfish water quality in this shellfish area.

TABLE 8 - Heavily modified waters

HMWB name	Distance	Comment
Lough Mahon	0-5 km	Estuarine
Cork Harbour	0-5 km	Coastal

Table 8 lists the heavily modified marine waters located within 5 kilometres of the designated shellfish area. Map 17 illustrates these pressures. Such modifications can affect flow and sediment movements but the effects can cease once the modifications are established.

There are 2 heavily modified marine waters in the vicinity of this shellfish area. Again, there is probably little or no connectivity between them and the shellfish area (Map 17). Monitoring in the area does not highlight any water quality issues which are likely to result from these modifications and the WFD assessment has deemed the area to be 'not at risk' from morphological pressures. Therefore, these modifications are unlikely to be affecting shellfish water quality in this shellfish area.

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5.2 Land-based Pressures

The contributing catchment is used to identify the land-based pressures that could potentially be impacting on shellfish water quality and therefore the size of the contributing catchment can be important in determining the magnitude of the pressures. Contributing catchment sizes vary considerably; however, pressures are only considered up to a distance of 20 kilometres from the shellfish area and are, where appropriate, divided into four zones: direct, 0 to 5 kilometres, 5 to 10 kilometres and 10 to 20 kilometres. Pressures within the catchment, but further than 20 kilometres from the shellfish area, are also included if they are considered significant. In addition significant land-based pressures acting in adjacent waterbodies which may have an impact due to tidal influences are also considered where relevant.

Land-based pressure types include point source pressures, diffuse source pressures and morphology pressures. The shellfish water quality parameters potentially impacted by these pressures are as follows:

- Point source pressures can affect the whole suite of shellfish water quality parameters. For example, waste water treatment plants, CSOs and agricultural point sources can impact on the levels of faecal coliforms, nutrients, bacteria and other harmful substances in receiving waters while IPPC licensed industries, mines, quarries and landfills can impact on the levels of polluting substances in receiving waters such as petroleum hydrocarbons, organohalogenated substances and metals. Abstractions are included under this heading and can impact on salinity levels, though not to an extent likely to lead to non-compliances with shellfish water salinity standards, as well as reducing the dilution available for polluting discharges.
- Diffuse source pressures affect many of the shellfish water quality parameters. Agricultural activity and on-site waste water treatment systems (OSWWTS) can impact on faecal coliform levels as well as general physico-chemical parameters such as the levels of suspended sediments and dissolved oxygen. Forestry activity can impact on the pH of receiving waters as well as on the levels of suspended solids and nutrients and it is also associated with the use of pesticides which can contain organohalogenated substances.
- Land-based morphology pressures, and associated activities, are not generally associated with impacts on water quality in marine areas. Their impacts are usually associated with the loss of natural freshwater features and habitats and changes to the behaviour of freshwater systems including sediment movement. Channelisation activities however, if occurring close to shellfish areas, can impact on shellfish water quality, particularly the levels of suspended sediment.

The following tables summarise the nature and extent of land based pressures within the catchment up to a distance of 20 kilometres from the designated shellfish area. The likelihood for these pressures to impact on shellfish water quality parameters is discussed. All of the factors discussed at the beginning of this chapter can affect the likelihood for land-based pressures to impact on shellfish waters.

5.2.1 Point Source Pressures

Urban Waste Water Treatment Plants and Combined Sewer Overflows

Table 9 lists the urban waste water treatment plants in the catchment up to a distance of 20 kilometres from the shellfish area. Map 18 illustrates these pressures and map references link the map and table. Information provided in the table in relation to the plants includes:

- the distance of the plants from the shellfish area
- the WFD status of the water body within which the plants are located
- whether the plants are included in the current Water Services Investment Programme 07-09
- the design capacity (in terms of population equivalents (P.E.)) of the plants
- the percentage at which the plants are operating above or below their design capacity currently
- the percentage at which the plants are likely to be operating above or below their design capacity in 2015 based on population projections
- the WFD risk designations associated with the plants and the reasons behind the risk designations

The WFD risk assessment in relation to urban waste water treatment plants was updated in 2008 to feed into the draft RBMPs with a further update currently underway (due for completion by November 2009). The plants were designated as 'at risk' for a variety of reasons including:

- A Insufficient WWTP capacity – existing load
- B Insufficient WWTP capacity – future load
- C Insufficient assimilative capacity for BOD – existing load
- D Insufficient assimilative capacity for BOD – future load
- E Insufficient assimilative capacity for nutrients – existing load
- F Insufficient assimilative capacity for nutrients – future load
- G Historical deterioration in downstream Q value where the Q station is within 3 kilometres of the outfall
- H Downstream Q value is less than 4 where the Q station is within 3 kilometres of the outfall
- I Deterioration in upstream to downstream Q value where the distance between Q stations is less than 3 kilometres
- J Exceedance of bathing water quality within 1 kilometre of the outfall
- K Exceedance of shellfish water quality within 1 kilometre of the outfall
- L Expert opinion

Waste water discharges from waste water treatment plants can contain a wide range of potentially polluting components originating from households, industry and urban areas. These discharges can affect the levels of faecal coliforms, nutrients, dissolved oxygen, suspended sediment, organic wastes and harmful chemicals in receiving waters.

The 2008 risk assessment identified 11 urban waste water treatment plants within the catchment with 6 of these 'at risk' due to insufficient plant capacity and insufficient assimilative capacity in receiving waters for BOD and nutrients.

The WFD risk assessment was reviewed by experts in September 2009 with regard to Water Services Investment Programme and waste water licensing actions. The most significant plants were identified on the basis of proximity, plant performance, population equivalent and level of treatment. Three key plants were identified by this expert judgement review.

Midleton is by far the largest 'at risk' plant with a design population equivalent (P.E.) of 10,000. This plant is currently working at 71% above its design capacity and this is projected to increase to 97% by 2015. It is located very close to the shellfish area but it does incorporate a high level of treatment and it is included in the current Water Services Investment Programme.

Carrigtwohill is the second largest "at risk" plant with a design P.E. of 4,500. Again this plant provides a high level of treatment but requires additional capacity under the Water Services Investment Programme.

The largest plant in the catchment is at Cork City (Carrigrenan). This is working well within its design capacity and it also incorporates a high level of treatment but is identified as it serves a population equivalent of over 400,000.

These three plants and their sewerage collection systems are considered the most likely sources of the faecal contamination and elevated nutrient levels indicated by shellfish flesh and WFD monitoring, and could be affecting shellfish water quality in this shellfish area, subject to further detailed investigation.

In addition, the agglomerations of Passage West, Cobh, Monkstown, Ringaskiddy, Crosshaven and Carrigaline are considered as key pressures due to their potential tidal influence via adjacent waterbodies. These pressures also influence the Rostellan north, south and west (proposed) shellfish areas and are addressed in the respective PRPs for these areas.

TABLE 9 – Urban waste water treatment plants

Name	Map Ref	Dist	Status	WSIP 07-09	Capacity PE	% surplus existing	% surplus future	At Risk
Ballincurrig	73	10-20	Good	No	125	-64 %	-64 %	Yes - A/B
Carrignavar	73	10-20	Moderate	No	600	1 %	-30 %	Yes -D
Dungourney	137	10-20	Poor	No	100	-60%	60%	Yes - A
Lisgould	177	5-10	Moderate	No	80	20%	80%	No
Carrigrenan (Cork city)	102	0-5	nd	No	413,000	22 %	15 %	No
Middleton	183	0-5	nd	Yes	10,000	-20 %	-11 %	Yes - A/B
Carrigtwohill	103	0-5	nd	Yes	4,500	-62%	4%	Yes - A
Coole East	124	10-20	Moderate	No	50	0 %	0 %	No
Killeens	165	10-20	Moderate	Yes	470	21%	21 %	Yes - C/D
Knockraha	173	5-10	Good	No	300	23 %	4 %	No

NOTE: A minus figure in the percentage surplus columns means that the plant is working above its design capacity, nd denotes 'no data' where plants are located in areas with no WFD status information

Note 1. Dungourney – A Planning application has been approved for a housing development and new WWTP with 400pe capacity.

Note 2 Lisgould - Existing system near capacity but new plant built but not operational yet.

Note 3 Middleton plant currently operating over capacity. Upograde to 15,000 pe approved but future population projections based on approved planning applications could see population rise to 16,650.

Note 4 Carrigtwohill – Existing plant operating over capacity. Proposal for new upgrade to 45,000pe plant with DoEh&LG. Consultants projections forecast domestic population at 12,000 and future industrial pop.at 31,000.

Table 10 lists the Combined Sewer Overflows (CSOs) in the catchment up to a distance of 20 kilometres from the designated shellfish area associated with these agglomerations. Map 18 illustrates these pressures and map references link the map and table. Information provided in the table in relation to the CSOs includes:

- the distance of the CSOs from the shellfish area
- the WFD status of the water body within which the CSOs are located

TABLE 10 – Combined Sewer Overflows

CSO Name	Map Ref	Distance	Status
Cork City	556 - 619	10-20	Moderate/Poor
Midleton	530 - 532	0-5	nd
Carrigtwohill	538 - 540	0-5	Poor
TRV CSO	509 - 510	10-20	Moderate

NOTE: nd denotes 'no data' where CSOs are located in areas with no WFD status information

Discharges from CSOs can contain a wide range of potentially polluting components originating from households, industry and urban areas. These discharges, which receive no treatment, can affect the levels of faecal coliforms, nutrients, dissolved oxygen, suspended sediment, organic wastes and harmful chemicals in receiving waters.

The inventory of CSOs compiled during the WFD characterisation process shows that there are 65 known significant CSOs within the catchment. The majority of them are situated in Cork City, more than 10 kilometres away from the shellfish area. However, CSOs in Midleton and Carrigtwohill are situated near the shellfish area. Due to the number of CSOs in the catchment, and the fact that they are a possible source of the faecal contamination and elevated nutrient levels indicated by shellfish flesh and WFD monitoring, CSOs could possibly be affecting shellfish water quality in this shellfish area.

Agricultural IPPCs and land-based finfish farms

TABLE 11 – Agricultural IPPCs and land-based finfish farms

License number	Map Ref	Distance	Status	Nature	Note
P0316-0	6	0-5	nd	Pig farm	1,100 sows, 17 km spreading radius

NOTE: nd denotes 'no data' where operations are located in areas with no WFD status information

Table 11 lists the agricultural IPPCs and finfish farms in the catchment up to a distance of 20 kilometres from the designated shellfish area. Map 19 illustrates these pressures and map references link the map and table. Information provided in the table in relation to the agricultural IPPCs and land-based finfish farms includes:

- the distance of the units from the designated shellfish area
- the WFD status of the water bodies within which the units are located.
- any available additional information e.g. the spreading radius for spreading of slurry

There is 1 pig farm within the catchment. Slurry from pig farms is usually landspread and can affect levels of faecal coliforms, nutrients, dissolved oxygen and organic wastes if it is lost to waters.

Whilst the pig farm is situated quite close to the shellfish area and is a potential source of faecal contamination and elevated nutrient levels, this unit is considered unlikely to be affecting shellfish water quality in this shellfish area given the unit's level of activity.

Abstractions

TABLE 12 – Abstractions

Name	Map Ref	Type	Distance	Status	Abs Rate m ³ day ⁻¹	At Risk (Ratio)
Ballyroberts	97	Groundwater	10-20	Good	3	No
Carrig na Bhfear 1	103	Groundwater	10-20	Moderate	150	No
Carrig na Bhfear 1	105	Groundwater	10-20	Moderate	147	No
Clash Leamlara	105	Groundwater	5-10	Good	10	No
I.D.A. Carrigtwohill	123	Groundwater	0-5	nd	1,400	No
I.D.A. Carrigtwohill	124	Groundwater	0-5	nd	600	No
Piercetown	154	Groundwater	10-20	Moderate	8	No
Walshstown Beg	164	Groundwater	10-20	Good	10	No
Watergrasshill 2	165	Groundwater	10-20	Moderate	73	Yes (>10 %)
Whitechurch	166	Groundwater	10-20	Moderate	5	No
Whitechurch 2	168	Groundwater	10-20	Moderate	10	No
Ballincurrig	178	Groundwater	5-10	Moderate	50	No
Beamish & Crawford	1389	Groundwater	10-20	nd	181	No
Bilberry	1393	Groundwater	5-10	Poor	5	No
Bored Well	1410	Groundwater	5-10	Moderate	130	No
Clonmult	1423	Groundwater	10-20	Poor	65	No
Coole East	1430	Groundwater	5-10	Moderate	50	No
Dawn Meats	1438	Groundwater	0-5	Moderate	421	No
Lisgoold	1477	Groundwater	10-20	Good	40	No
Lisgoold	1478	Groundwater	10-20	Good	0	No
Maltings	1481	Groundwater	0-5	nd	0.95	No
Stoneview Blarney	1502	Groundwater	5-10	Moderate	13	No
Tibbstown	1817	Groundwater	5-10	nd	179	No
Leamlara	1833	Groundwater	5-10	Good	3	No
Watergrasshill	1898	Groundwater	10-20	Moderate	200	Yes

1						(>10 %)
Owenacurra	2195	River	5-10	Moderate	0	No
Carrigtwhohill	2196	Lake	5-10	nd	5,500	No
Butlerstown	2214	River	10-20	Good	350	Yes (>10 %)
Butlerstown	2215	River	10-20	Moderate	700	Yes (>10 %)
Butlerstown	2216	River	5-10	Good	350	Yes (>10 %)
Glashaboy	2217	River	5-10	Good	15,000	Yes (>10 %)
Lee	2241	River	10-20	Poor	49,600	Yes (>10 %)
Lee	2391	River	10-20	Poor	50,000	Yes (>10 %)
Owenacurra	2421	River	5-10	Moderate	2,500	No
Healy's Quarry	2473	Groundwater	0-5	nd	6,000	No
John A. Wood	2474	Groundwater	0-5	nd	24,545	No
Ballinacurrig	2511	Groundwater	10-20	Moderate	0	No
Ballinacurrig	2519	Groundwater	10-20	Good	50	No
Corbally 1	2520	Groundwater	5-10	Good	0	No
Corbally 2	2521	Groundwater	10-20	Good	0	No
Lisgould	2522	Groundwater	10-20	Good	50	No

NOTE: nd denotes 'no data' where abstractions are located in areas with no WFD status information

Table 12 lists the abstractions in the catchment up to a distance of 20 kilometres from the designated shellfish area. Map 20 illustrates these pressures and map references link the map and table. Information provided in the table in relation to abstractions includes:

- the type of abstraction (river, lake or groundwater)
- the distance of the abstraction from the designated shellfish area
- the WFD status of the water body within which the abstraction is located
- the abstraction rate, expressed in cubic metres per day
- the WFD risk designations associated with the abstractions and the reasons behind the designations

The WFD risk assessment in relation to abstractions was updated in 2008 to feed into the draft RBMPs. Abstractions are deemed to be 'at risk' if they account for a significant proportion (>10%) of the resource. For river abstractions, the net abstraction is expressed as a proportion of the Q95 flow (i.e. the flow that is exceeded 95% of the time). For lake abstractions, the net abstraction is expressed as a proportion of the Q50 inflow to the lake (i.e. the long term median inflow). For groundwater abstractions, the net abstraction is expressed as a proportion of recharge volume (i.e. long term average recharge across the groundwater bodies).

Generally it is very unlikely that abstractions would lead to non-compliances with the shellfish standards for salinity in shellfish areas. Abstractions that represent a large

proportion of their corresponding resources can decrease available dilution capacity but this is also unlikely to affect shellfish areas.

There are 41 abstractions in the catchment. All but 9 of these are groundwater abstractions. Only 2 of the groundwater abstraction are 'at risk' whereas 6 of the 9 surface water abstractions are 'at risk' in terms of freshwater resource. These abstractions may be decreasing available dilution capacity which could be increasing the concentration of pollutants reaching marine areas, however, it is considered that these abstractions do not represent key pressures in this shellfish area due to the extensive tidal flushing within the system.

Water Treatment Plants

TABLE 13 - Water treatment plants

Name	Map Ref	Distance	Status	Risk	Risk
Midleton	198	5-10	Moderate	Yes	expert judgement
Glashaboy PWS	201	5-10	nd	Yes	expert judgement
Watergrasshill PWS	226	10-20	Moderate	Yes	expert judgement
Lee Road Water Works	391	10-20	Poor	Yes	expert judgement
Glanmire Regional	393	5-10	Good	Yes	expert judgement

NOTE: nd denotes 'no data' where plants are located in areas with no WFD status information

Table 13 lists the water treatment plants in the catchment up to a distance of 20 kilometres from the designated shellfish area. Map 20 illustrates these pressures and map references link the map and table. Information provided in the table in relation to the water treatment plants includes:

- the distance of the plants from the designated shellfish area
- the WFD status of the water bodies within which the plants are located
- the WFD risk designations associated with the plants and the reasoning behind the designations

The WFD risk assessment for water treatment plants dates back to the Article V characterisation process which was undertaken in 2004 and 2005. At that time expert opinion within the Local Authorities was used to indicate whether plants were 'at risk' of impacting on their surrounding water environment.

Discharges from Water Treatment Plants (WTPs) can affect the levels of suspended solids, algae and pathogens in receiving waters. Aluminium can also be present from the treatment process.

There are 5 water treatment plants in the catchment and all have been designated as 'at risk' of impacting their surrounding water environment. Monitoring does not indicate any water quality issues which are likely to have arisen from these plants and therefore it is unlikely that that are affecting shellfish water quality in this shellfish area.

Integrated Pollution Prevention and Control Industries

TABLE 14 - Integrated Pollution Prevention Control Licenses

Name	Map Ref	Distance	Status	Risk
Cognis Ireland Ltd	32	5-10	nd	No
Dawn Meats (Midleton) Ltd	37	0-5	nd	No
Dulux Paints Ireland Ltd	38	10-20	Moderate	Yes – E/F
Dynea Ireland Ltd	39	0-5	nd	No
Electricity Supply Board	44	10-20	nd	No
Electricity Supply Board	45	10-20	nd	No
Electricity Supply Board	46	10-20	nd	No
Irish Oxygen Co. Ltd	51	10-20	Poor	No
True Temper Ltd	56	10-20	Moderate	No
Wexport Ltd	57	5-10	nd	No

NOTE: nd denotes 'no data' where industries are located in areas with no WFD status information

Table 14 lists the IPPC licensed industries in the catchment up to a distance of 20 kilometres from the designated shellfish area. Map 20 illustrates these pressures and map references link the map and table. Information provided in the table in relation to the licensed industries includes:

- the distance of the industries from the designated shellfish area
- the WFD status of the water bodies within which the industries are located
- the WFD risk designations associated with the industries and the reasoning behind the designations

The WFD risk assessment in relation to IPPC licensed industries was updated in 2008 to feed into the draft RBMPs. The industries were designated as 'at risk' for a variety of reasons which are outlined on page 59.

Discharges from IPPC licensed industries are diverse and can affect the levels of faecal coliforms, nutrients, suspended sediments, dissolved oxygen as well as a wide range of chemicals in receiving waters.

There are 10 IPPC licensed industries within the catchment. Only 1 of them has been designated as 'at risk' due to assimilative capacity limitations in the receiving waters. Discharges from this paint-producing industry are likely to contain chemicals and, as monitoring in this shellfish area has not indicated impacts associated with chemicals, it is unlikely that this industry is affecting shellfish water quality in this shellfish area.

Section 4 Licensed Industries

TABLE 15 - Section 4 Licenses

Name	Map Ref	Distance	Status	Risk
C&C (Ireland) Ltd	69	0-5 km	nd	No
Castlelands Construction Ltd	71	10-20 km	Moderate	No
Dave O'Brien & John Wiggins	80	5-10 km	Moderate	No
Dawn Dairies Ltd	81	10-20 km	Moderate	No
Executive Trust Ltd t/a Thrifty Car Rental	89	10-20 km	Moderate	No
Fitzgerald Bros Ltd., Ballycra	94	0-5 km	nd	No
Irish Asphalt Ltd	106	direct	nd	No
Irish Distillers Ltd	107	10-20	nd	No

Name	Map Ref	Distance	Status	Risk
M/S J.H. Bennett & Co. Ltd	121	0-5 km	nd	No
R & W Davidson (Ireland) Ltd	140	5-10 km	Good	No

NOTE: nd denotes 'no data' where industries are located in areas with no WFD status information

Table 15 lists the Section 4 licensed industries in the catchment up to a distance of 20 kilometres from the designated shellfish area. Map 20 illustrates these pressures and map references link the map and table. Information provided in the table in relation to the industries includes:

- the distance of the industries from the designated shellfish area
- the WFD status of the water bodies within which the industries are located
- the WFD risk designations associated with the industries and the reasoning behind the designations

Discharges from Section 4 licensed industries are diverse and can affect the levels of faecal coliforms, nutrients, suspended sediments, dissolved oxygen as well as a wide range of chemicals in receiving waters.

The WFD risk assessment in relation to Section 4 licensed industries was updated in 2008. There are 10 Section 4 licensed industries in the catchment and having regard to the updated risk assessments, the nature of the industries involved and other factors such as distances from the shellfish area, it is not considered likely that any of these industries is affecting the quality of the shellfish waters.

Quarries, mines, landfills and contaminated lands

TABLE 16 - Quarries, mines, landfills and contaminated lands

Name	Map Ref	Distance	Status	Risk	Notes
Michael Broderick	337	5-10	Good	No	Quarry
Carrigtwohill Quarry (Readymix)	338	0-5	Poor	No	Quarry
Whelans Quarries	339	5-10	Good	No	Quarry
John A. Wood Ltd	340	0-5	nd	No	Quarry
Milebush Quarry	341	0-5	nd	No	Quarry
Cappagh Sand & Gravel Ltd	342	0-5	nd	No	Quarry
Coppingerstown Quarry	343	0-5	nd	No	Quarry
Moymur Quarries	346	10-20	Poor	No	Quarry
O'Mahoney Sand & Gravel	355	0-5	Poor	No	Quarry
East Cork Landfill	253	Direct	nd	Yes	Lined
Kinsale Road Landfill	264	10-20	Moderate	Yes	Unlined
Little Island Landfill	265	5-10	nd	No	Unlined
Lotamore Landfill	266	5-10	Good	No	Unlined
Thornbush Holdings Ltd	3	10-20	Moderate	No	Contaminated site
Midleton Distilleries	4	5-10	Poor	No	Contaminated site
True Temper Ltd	5	5-10	Poor	Yes	Contaminated

					site
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NOTE: nd denotes 'no data' where operations are located in areas with no status information

Table 16 lists the quarries, mines, landfills and contaminated lands in the catchment up to a distance of 20 kilometres from the designated shellfish area. Map 20 illustrates these pressures and map references link the map and table. Information provided in the table in relation to the plants includes:

- the distance of the industries from the designated shellfish area
- the WFD status of the water bodies within which the plants are located
- the WFD risk designations associated with the industries

Some of the WFD risk assessments in relation to these point sources were updated in 2008 to feed into the draft RBMPs but some of the assessments date back to the WFD characterisation process in 2004 and 2005. Expert opinion within Local Authorities was used to assign risk designations to quarries and landfills but monitoring data was used for mines and contaminated lands.

Mining and quarrying operations can impact on levels of suspended solids and metals in receiving waters whilst landfills and contaminated sites can be more diverse and impact on the levels of nutrients, suspended sediments and oxygen levels as well as metals and other chemicals.

There are 9 quarries, 4 landfills and 3 contaminated sites within the catchment. None of the quarries have been designated as 'at risk' of impacting their surrounding environment. One of the contaminated sites has been designated as 'at risk' due to the levels of hydrocarbons at the site. However, as monitoring in the area does not indicate an issue with hydrocarbons, it is unlikely to be affecting shellfish water quality in this shellfish area. Two of the landfills were formerly designated as 'at risk' however remediation measures have since taken place at the sites. In addition, these sites are not considered as possible sources of faecal coliforms and therefore are not likely to be impacting shellfish water quality in this shellfish area.

Other Point Sources

Whitegate oil refinery is situated at Corkbeg, Whitegate near Midleton. It produces 75,000 barrels of oil per day, 40% of Ireland's fuel needs. Processing and shipment of petroleum products are associated with pollution from hydrocarbons. Monitoring in the shellfish area does not highlight any issues with hydrocarbons and therefore it is unlikely that this oil terminal is affecting shellfish water quality in this shellfish area.

5.2.2 Diffuse Source Pressures

On-site waste water treatment systems

TABLE 17 - On-site waste water treatment systems

Risk	Number	% of total
Total number	22,636	-
Number per km ² in the catchment	13.3	-
Number per km ² nationally	1.4	-
Number that are high risk to surface waters from pathogens	14,487	64 %
Number that are high risk to groundwaters from pathogens	13,186	58 %
Number that are high risk to surface waters from phosphorus	11,011	49 %
Number that are high risk to groundwaters from phosphorus	11,330	50 %
High likelihood of inadequate percolation of leachate	10,686	47 %

Table 17 summarises the numbers of on-site waste water treatment systems (OSWWTS) within the catchment up to a distance of 20 kilometres from the designated shellfish area and outlines how many of them are located in areas of high risk to surface and groundwaters from pathogens and phosphorus and how many of them are located in areas where the likelihood of inadequate percolation of leachate is high. Map 21 illustrates the locations of the OSWWTSs while Maps 6 to 10 illustrate the risk to surface and groundwaters and the likelihood of inadequate percolation, all of which is based on soil, sub-soil and geological characteristics. Generally, systems located in areas where effluent cannot get away underground pose a risk to surface waters while systems located in areas where the effluent moves too quickly through the subsoil pose a risk to groundwaters. OSWWTS effluent can impact on the levels of faecal coliforms, suspended sediments, nutrients and dissolved oxygen in receiving waters. In addition, the use of household cleaning products can introduce a range of harmful chemicals to the water environment.

There are a large number of systems in the contributing catchment and their density is much higher than the national average. In particular, approximately 150 dwellings have been identified in high vulnerability settings, some of which discharge directly to waterbody in the vicinity of these designated Shellfish Waters. Shellfish monitoring indicates the possibility of faecal contamination in this shellfish area which could be arising from this source. These systems therefore could possibly be affecting shellfish water quality in this shellfish area.

Agriculture

TABLE 18 - Livestock units and chemical fertiliser usage

Indicator	Catchment (per ha of farmed land)	National Average (per ha of farmed land)
Area of farmed land in the catchment = approximately 120,431 hectares		
Livestock units	1.53 LU	1.20 LU
Nitrogen fertiliser usage	131.77 kg	92.09 kg
Phosphorus fertiliser usage	10.66 kg	9.74

Nitrates Directive limit = 170 kg N per hectare = approx. 2 LU per hectare

Nitrates Directive derogation = 250 kg N per hectare = approx. 3 LU per hectare.

Table 18 provides an estimate of the average number of dairy and drystock livestock units and the average loadings of nitrogen and phosphorus chemical fertiliser per hectare of farmed land within the contributing catchment area. Maps 22, 23 and 24 illustrate this. The figures beneath the table express the nitrate limit (and Ireland's derogation) under the Nitrates Directive in terms of livestock densities. Discharges related to agriculture can affect the levels of faecal coliforms, suspended sediments, nutrients and dissolved oxygen in receiving waters. In addition, the use of pesticides and herbicides can introduce a range of harmful chemicals to the water environment.

The area of farmed land in this catchment is large. The EPA's diffuse model risk assessment, which is based on percentages of diffuse land cover including agriculture, highlights many diffuse risk areas in the catchment (Map 13). Estimates of livestock density and fertiliser usage are higher than the national averages so the agricultural loads generated in the catchment could therefore be significant. However, the prevalence of dry soil types in the catchment (Map 5) means that the potential risk of agricultural runoff is relatively low. Agriculture could be a source of the faecal contamination indicated by the shellfish flesh monitoring and the elevated nutrient levels indicated by WFD monitoring. Therefore, agriculture could possibly be affecting shellfish water quality in this shellfish area.

Forestry

TABLE 19 - Forestry types

Type	Area	Percentage of area
Conifers	143.06 km ²	8.4 %
Broadleaves	36.14 km ²	2.1 %
Mixed	8.99 km ²	0.5 %
Other	0 km ²	0 %
Cleared	12.47 km ²	0.7 %
Unknown	9.62 km ²	0.6 %
Total	210.29 km ²	12.3 %
Nationally	6,795 km ²	10.0 %

Table 19 presents the area and percentage area of the catchment under the various types of forest cover. Maps 25, 26 and 27 illustrate this. Forestry activity can impact on the pH of receiving waters as well as on the levels of suspended solids and nutrients. It is also associated with the use of pesticides which can introduce harmful chemicals to the water environment.

This is a very large catchment and the percentage area under forest cover is higher than the national average. Unlike agriculture, the location of forestry activity is known and forestry activity is remote from the shellfish area. The EPA's diffuse model risk assessment, which is based on percentages of diffuse land cover including forestry, highlights many diffuse risk areas in the catchment (Map 13). However, the more recent risk assessment, undertaken by the WFD Forest and Water study, does not highlight any risk areas. Therefore, it is unlikely that forestry is affecting shellfish water quality in this shellfish area.

5.2.3 Morphology Pressures

Physical Modifications

TABLE 20 - Channelisation

Physical modification	Extent	Comment
Channelisation	30 km	Carrigrohane – Maglin, Cork Slob, Killard, Tramore, Glasheen

Table 20 summarises the occurrences of channelisation within the contributing catchment area up to a distance of 20 kilometres from the designated shellfish area. Map 29 illustrates this. Channelisation, if it occurs reasonably close to a shellfish area, can affect suspended sediment levels in the shellfish area while it is taking place.

Just over 30 kilometres of stream length has been channelised in this catchment, most of it in the Cork city area. However, as none of it is located close to the shellfish area, it is unlikely to affect shellfish water quality in this shellfish area.

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5.3 Summary of Key Pressures

Information from existing data sources has been used to identify all of the pressures acting on the shellfish area and to assess their likelihood to be affecting shellfish water quality in this shellfish area.

The status at this site is impacted by faecal coliforms. The area also is subject to a prohibition notice due to Norovirus. Both of these issues are indicative of sewage related key pressures. Dissolved inorganic nitrogen and dissolved oxygen status issues are also identified in the general area.

This summary section highlights:

- **key pressures**

The key pressures are those identified as most likely to be affecting shellfish water quality. The final PRP will confirm and focus on these key pressures.

- **potential secondary pressures**

These pressures are identified as possibly affecting shellfish water quality. The final PRP will either confirm them as key pressures or eliminate them from further consideration.

5.3.1 Key Pressures

1. *Urban waste water treatment plants and CSOs*

The WFD risk assessment was reviewed by experts in September 2009 with regard to Water Services Investment Programme and waste water licensing actions. The most significant plants were identified on the basis of proximity, plant performance, population equivalent and level of treatment. Three key plants were identified by this expert judgement review.

Midleton is by far the largest 'at risk' plant with a design population equivalent (P.E.) of 10,000. This plant is currently working at 71% above its design capacity and this is projected to increase to 97% by 2015. It is located very close to the shellfish area but it does incorporate a high level of treatment and it is included in the current Water Services Investment Programme.

Carrigtwohill is the second largest "at risk" plant with a design P.E. of 4,500. Again this plant provides a high level of treatment but requires additional capacity under the Water Services Investment Programme.

The largest plant in the catchment is at Cork City (Carrigrenan). This is working well within its design capacity and it also incorporates a high level of treatment but is identified as it serves a population equivalent of over 400,000.

These three plants and their sewerage collection systems are considered the most likely sources of the faecal contamination and elevated nutrient levels indicated by

shellfish flesh and WFD monitoring, and could be affecting shellfish water quality in this shellfish area, subject to further detailed investigation.

In addition, the agglomerations of Passage West, Cobh, Monkstown, Ringaskiddy, Crosshaven and Carrighaline are considered as key pressures due to their potential tidal influence via adjacent waterbodies. These pressures also influence the Rostellan north, south and west (proposed) shellfish areas and are addressed in the respective PRPs for these areas.

5.3.2 Potential Secondary Pressures

2. *Agriculture*

The area of farmed land in this catchment is large. The EPA's diffuse model risk assessment, which is based on percentages of diffuse land cover including agriculture, highlights many diffuse risk areas in the catchment. Estimates of livestock density and fertiliser usage are higher than the national averages so the agricultural loads generated in the catchment could therefore be significant. However, the prevalence of dry soil types in the catchment means that the potential risk of agricultural runoff is relatively low. Agriculture could be a source of the faecal contamination indicated by the shellfish flesh monitoring and the elevated nutrient levels indicated by WFD monitoring. Therefore, agriculture could possibly be affecting shellfish water quality in this shellfish area.

3. *On-site waste water treatment plants*

There are a large number of systems in the contributing catchment. In particular, approximately 150 dwellings have been identified in high vulnerability settings, some of which discharge directly to waterbody in the vicinity of these designated Shellfish Waters. Shellfish monitoring indicates the possibility of faecal contamination in this shellfish area which could be arising from this source. These systems therefore could possibly be affecting shellfish water quality in this shellfish area.

4. *Activities associated with marine structures*

Shipping, fishing and boating activities are associated with many of the marine structures located in the vicinity of the shellfish. There is 1 pier structure directly adjacent to the shellfish area and 21 additional pier structures, 10 piled structures and 2 causeways within 5 kilometres of the shellfish area. Port of Cork, one of Ireland's largest ports, and the principal port on the south coast, is situated approximately 10 kilometres to the west of the shellfish area. Shellfish flesh monitoring indicates faecal contamination in this shellfish area and WFD monitoring indicates issues with nutrient and DO levels. The activities associated with the structures could be a possible source of these water quality issues and therefore these activities could possibly be affecting shellfish water quality in this shellfish area.



Summary Information:

WaterBody Category:	Subbasin Waterbody
WaterBody Name:	Dungourney, Trib of Owennacurra
WaterBody Code:	IE_SW_19_1957
Overall Status:	Poor
Overall Objective:	[REDACTED]
Overall Risk:	1a At Risk
Applicable Supplementary Measures:	Unsewered; Urban & Industrial; Morphology; Forestry; Report data based upon Draft RBMP, 22/12/2008.



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Date Report Created 19/08/2009



Status Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957
Overall Status Result: Poor



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

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Risk Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957
Overall Risk Result: **1a** At Risk



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

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

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Objectives Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957
Overall Objective: [REDACTED]



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

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Basic Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957



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

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Urban and Industrial Discharges Supplementary Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957



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

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

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Physical Modifications Supplementary Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957



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

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Unsewered Properties Supplementary Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957



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

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Forestry Measures Report

WaterBody Category: Subbasin Waterbody
WaterBody Name: Dungourney, Trib of Owennacurra
WaterBody Code: IE_SW_19_1957



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

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

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Date Report Created 19/08/2009

SITE SYNOPSIS

SITE NAME: CORK HARBOUR SPA

SITE CODE: 004030

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas and Owenacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas Estuary, inner Lough Mahon, Lough Beg, Whitegate Bay and the Rostellan inlet.

Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nephtys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva lactuca* and *Enteromorpha* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for the birds. Salt marsh species present include Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Plantain (*Plantago maritima*), Lax-flowered Sea-lavender (*Limonium humile*) and Sea Arrowgrass (*Triglochin maritima*). Some shallow bay water is included in the site. Cork Harbour is adjacent to a major urban centre and a major industrial centre. Rostellan lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top five sites in the country. The five-year average annual core count for the entire harbour complex was 34,661 for the period 1996/97-2000/01. Of particular note is that the site supports an internationally important population of Redshank (1,614) - all figures given are average winter means for the 5 winters 1995/96-1999/00. A further 15 species have populations of national importance, as follows: Great Crested Grebe (218), Cormorant (620), Shelduck (1,426), Wigeon (1,750), Gadwall (15), Teal (807), Pintail (84), Shoveler (135), Red-breasted Merganser (90), Oystercatcher (791), Lapwing (3,614), Dunlin (4,936), Black-tailed Godwit (412), Curlew (1,345) and Greenshank (36). The Shelduck population is the largest in the country (9.6% of national total), while those of Shoveler (4.5% of total) and Pintail (4.2% of total) are also very substantial. The site has regionally or locally important populations of a range of other species, including Whooper Swan (10), Pochard (145), Golden Plover (805), Grey Plover (66) and Turnstone (99). Other species using the site include Bat-tailed Godwit (45), Mallard (456), Tufted Duck (97), Goldeneye (15), Coot (77), Mute Swan (39), Ringed Plover (51), Knot (31), Little Grebe (68) and Grey Heron (47). Cork Harbour is an important

site for gulls in winter and autumn, especially Common Gull (2,630) and Lesser Black-backed Gull (261); Black-headed Gull (948) also occurs.

A range of passage waders occur regularly in autumn, including Ruff (5-10), Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.

The wintering birds in Cork Harbour have been monitored since the 1970s and are counted annually as part of the I-WeBS scheme.

Cork Harbour has a nationally important breeding colony of Common Tern (3-year mean of 69 pairs for the period 1998-2000, with a maximum of 102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Extensive areas of estuarine habitat have been reclaimed since about the 1950s for industrial, port-related and road projects, and further reclamation remains a threat. As Cork Harbour is adjacent to a major urban centre and a major industrial centre, water quality is variable, with the estuary of the River Lee and parts of the Inner Harbour being somewhat eutrophic. However, the polluted conditions may not be having significant impacts on the bird populations. Oil pollution from shipping in Cork Harbour is a general threat. Recreational activities are high in some areas of the harbour, including jet skiing which causes disturbance to roosting birds.

Cork Harbour has is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its population of Redshank. In addition, there are at least 15 wintering species that have populations of national importance, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover, Bar-tailed Godwit, Ruff and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it.

4.7.2004

SITE SYNOPSIS

SITE NAME: GREAT ISLAND CHANNEL

SITE CODE: 001058

The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and, compared to the rest of Cork Harbour, is relatively undisturbed. Within the site is the estuary of the Owennacurra and Dungourney Rivers. These rivers, which flow through Midleton, provide the main source of freshwater to the North Channel.

The main habitats of conservation interest are the sheltered tidal sand and mudflats and Atlantic salt meadows, both habitats listed on Annex I of the EU Habitats Directive. Owing to the sheltered conditions, the intertidal flats are composed mainly of soft muds. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nephtys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algal species occur on the flats, especially *Ulva lactuca* and *Enteromorpha* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially at Rossleague and Belvelly. The salt marshes are scattered through the site and are all of the estuarine type on mud substrate. Species present include Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Plantain (*Plantago maritima*), Greater Sea-spurry (*Spergularia media*), Sea Lavender (*Limonium humile*), Sea Arrowgrass (*Triglochin maritimum*), Mayweed (*Matricaria maritima*) and Red Fescue (*Festuca rubra*).

The site is extremely important for wintering waterfowl and is considered to contain three of the top five areas within Cork Harbour, namely North Channel, Harper's Island and Belvelly-Marino Point. Shelduck are the most frequent duck species with 800-1000 birds centred on the Fota/Marino Point area. There are also large flocks of Teal and Wigeon, especially at the eastern end. Waders occur in the greatest density north of Rosslare, with Dunlin, Godwit, Curlew and Golden Plover the commonest species. A population of about 80 Grey Plover is a notable feature of the area. All the mudflats support feeding birds; the main roost sites are at Weir Island and Brown Island and to the north of Fota at Killacloyne and Harper's Island. Ahanesk supports a roost also but is subject to disturbance. The numbers of Grey Plover and Shelduck, as given above, are of national importance.

The site is an integral part of Cork Harbour which is a wetland of international importance for the birds it supports. Overall, Cork Harbour regularly holds over 20,000 waterfowl and contains Internationally important numbers of Black-tailed Godwit (1,181) and Redshank (1,896) along with Nationally important numbers of

nineteen other species. Furthermore, it contains the large Dunlin (12,019) and Lapwing (12,528) flocks. All counts are average peaks, 1994/95 – 1996/97. Much of the site forms part of Cork Harbour Special Protection Area, an important bird area designated under the EU Birds Directive.

While the main land use within the site is aquaculture (Oyster farming), the greatest threats to its conservation significance come from road works, infilling, sewage outflows and possible marina developments.

The site is of major importance for the two habitats listed on the EU Habitats Directive that it contains, as well as for its important numbers of wintering waders and wildfowl. It also supports a good invertebrate fauna.

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