Shellfish Pollution Reduction Programme

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 X

KILMAKILLOGE HARBOUR SHELLFISH AREA
COUNTY KERRY

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ABBREVIATIONS

AA	Appropriate Assessment
BOD	Biochemical Oxygen Demand
CFB	Central Fisheries Board
CSO	Combined Sewer 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
OSWWTS	On-Site Waste Water Treatment System
P.E.	Population Equivalent
PRP	Pollution Reduction Programme
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 Programmes (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 Communications, Marine and Natural Resources is responsible for the development of Shellfish PRPs. However, this responsibility was transferred to the Department of the Environment, Heritage and Local Government (DEHLG) on 5th November 2008. An Inter-Departmental /Inter Agency Shellfish Waters Management Committee (SWMC) supports the Department in the development of the Shellfish PRPs.

The Regulations also place 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. Mandatory (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)	Mandatory Values (I)
pH (pH units)		7 – 9 pH units
Temperature (°C)	A discharge affecting shellfish waters must not cause the	No mandatory value set in the Directive

	temperature of the waters to exceed by more than 2°C the temperature of waters not so affected	
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	**Guideline 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	**Guideline 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 45 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 Programmes

The Directive and Regulations require that any non-compliances with the shellfish water quality parameter 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 Programmes (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 Shellfish PRPs (including the supporting characterisation reports and toolkit of measures) represent an initial phase of Shellfish PRP development, drawing on available information sources. Their development has been a desk-based exercise and they provide 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 Shellfish Pollution Reduction Programmes

A Strategic Environmental Assessment (SEA) of the Shellfish PRPs and supporting toolkit of measures has been carried out 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 PRPs resulted in mitigation of some of the measures contained in the PRPs and toolkit of measures 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 Shellfish PRPs has been 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 published in December 2009. They are the primary plans in place in relation to the water environment for the foreseeable future.

Article 13(5) of the WFD states that 'river basin management plans may be supplemented by the production of more detailed programmes and management plans for sub-basin, sector, issue, or water type, to deal with particular aspects of water management'. Shellfish PRPs are an example of such programmes. In addition, Article 13(4) and Annex VII of the WFD requires that RBMPs include 'a register of any more detailed programmes and management plans for the River Basin District dealing with particular sub-basins, sectors, issues or water types, together with a summary of their contents'. The Shellfish PRPs are included in the registers of each of the River Basin Districts.

Articles 4 (1)(c) and 4 (2) of the WFD specify that, in relation to protected areas, where more than one of set of objectives relate to a given body of water, the most stringent shall apply. Designated shellfish areas are included in the WFD register of protected areas provided for in Articles 6 and 7 of the directive.

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. Shellfish PRPs are therefore closely aligned with the RBMPs.

1.7 Layout of the Shellfish Pollution Reduction Programmes

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 and potential secondary pressures which are most likely to be impacting 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 Programmes

- The Pollution Reduction Programmes summarise the specific measures for controlling the key and potential secondary pressures, identified in this characterisation report, which are most likely to be impacting on shellfish water quality in Kilmakilloge Harbour shellfish area. This can be downloaded from www.environ.ie.

Toolkit of Measures

- The supporting toolkit of measures outlines all of the measures available for controlling all of the pressures which can impact on shellfish water quality. Due to the close alignments between the Shellfish PRPs and the RBMPs, the toolkit is drawn from the programme of measures contained within the RBMPs. This strengthens the integration of shellfish management and wider water quality management policy in Ireland. The toolkit can be downloaded from www.environ.ie.

2.0 GENERAL CHARACTERISTICS

Name	Kilmakilloge Harbour Shellfish Area
Map number	X
Year of designation	1994
Area	5.7 km^2
River Basin District	South Western RBD
County	Kerry
Location of sampling point	52 deg 46 20.8 min North (Lat) 9 deg 49 16.8 min West (Long)
Catchment area	867.52 km^2
Catchment area 20 Km limit	825.12 km^2
Adjacent PRP	Kenmare River/Sneem/Ardgroom

Kilmakilloge Harbour is situated in County Kerry in the South Western River Basin District (Map 1). The designated shellfish area is 5.7 km² in area and is located on the south shore of Kenmare Bay. The bay is long, narrow and southwest facing, and spans the border between Counties Cork and Kerry. Kilmakilloge Harbour extends to approximately 564 hectares, all of which is covered under the designation apart from the small area south of the road between Lauragh and Reenkilla. There is a large designated shellfish area covering the adjacent Kenmare Bay and Ardgroom Harbour. The two shellfish areas share the same contributing catchment.

The contributing catchment is 867.52 km^2 in area (Map 3). The land to the north of the bay is a mixture of mountain grazing and bogland with rough and improved pasture, and some afforestation, with an underlying bedrock of old red sandstone. The principal rivers to the north are the Roughty, Dromoghty, Cloonee, Tahilla, Blackwater, Reen and Finnihy. The land on the southern side is a combination of mountains, rough pasture and some improved grassland on old red sandstone. Three principal rivers, the Sneem, Ardsheelhane, and Owreagh drain the catchment on the southern side.

Kenmare is the largest town in the catchment with a population of approximately 1,844. There are several smaller towns and villages in the area, including Sneem with a population of 285 and Kilgarvan with a population of 185 as well as Tahilla, Greenane and Blacwater Bridge.

2.1 Protected areas

The designated shellfish area lies within Kilmakilloge Harbour cSAC (Map 11) which contains 3 habitats listed in Annex I of the EU Habitats Directive and 24 rare marine species. Other SACs which intersect the catchment include the Caha mountains, Dromore Wood, Kilgarvan Ice House, Killarney National Park, Cleanderry Wood, Cloonee and Inchiquin Loughs, Mucksna Wood, Derryclogher Bog, Clanmore Bog, Maulagowna Bog, Askive Wood, Kenmare River, Blackwater River, Drongawn Lough and Glanlough Woods.Drinking water sources in the catchment include the Gowla, Glashagoruv, Ahadav, Dromoghty and Sheen rivers as well as Gowlaun

Lough, Erick Lough, Dromtine Lough, Coomclogherane Lake, Cummer lough and Glenbeg Lough. Freshwater Pearl Mussel catchments include the Owenagappul, Capall, Cummeragh, Caragh, Kerry Blackwater and Owenreagh. SPAs include Killarney National Park.

2.2 Shellfish growing activity

Table 2 summarises the number and area of shellfish licensed areas within the designated shellfish area. Mussel cultivation is predominant in the area (Map 2). The average annual production of mussels between 2000 and 2004 was 410 tonnes. Oyster production between 2000 and 2002 averaged approximately 4.3 tonnes per annum.

TABLE 2 - Shellfish licensed areas

Shellfish types	Number	Area	% Area
Abalone	0	0	0 %
Clams	1	0.02 km^2	0.4 %
Cockles	0	0	0 %
Lobsters	0	0	0 %
Scallops	1	0.01 km^2	0.2 %
Mussels	20	0.7 km^2	12 %
Oysters	0	0	0 %
Sea Urchins	0	0	0 %
Periwinkles	0	0	0 %
Seaweed	0	0	0 %
Other	0	0	0 %

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 designated area, 9 water samples and 6 biota samples were available from the period 2004 to 2008. The mandatory and guideline values outlined in Table 1 were not breached in any of these samples.

For this designated area there are 20 faecal coliform biota results available from between February 2004 and August 2009. The shellfish guideline value for faecal coliforms in biota outlined in Table 1 was breached in five samples (May 2005, November 2006, August 2008, February 2009, August 2009). Therefore, this shellfish area is non-compliant with the faecal coliform guideline value.

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 4 EPA sites located in the designated area with monitoring data available from the period 2006 to 2008 for pH and dissolved oxygen. The values outlined in Table 1 for these parameters were not breached in any of the Kilmakilloge Harbour 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 Marine Institute, the National Parks and Wildlife Service (NPWS) and the Central Fisheries Board between 2005 and 2008.

The WFD status of the coastal water, within which the shellfish area is situated, is 'moderate' and therefore unsatisfactory, reflecting the results of expert opinion on the fish populations and the presence of chromium. The two rivers which discharge into the estuary, the Owenshagh and Croanshagh are 'good' and therefore satisfactory (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)) 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 within Kilmakilloge Harbour 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.

Overall Water Quality

The dedicated shellfish samples available for this shellfish area were found to be non-compliant with shellfish guideline values for faecal coliforms in biota 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 within the area (chromium) and in some of the waters discharging in the vicinity of this shellfish area. However, the available shellfish samples are compliant with the shellfish chromium standards.

The shellfish flesh classification indicates faecal contamination in the shellfish area.

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 then 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 shellfish areas	Department of Agriculture, Fisheries and Food register of licensed shellfish 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.

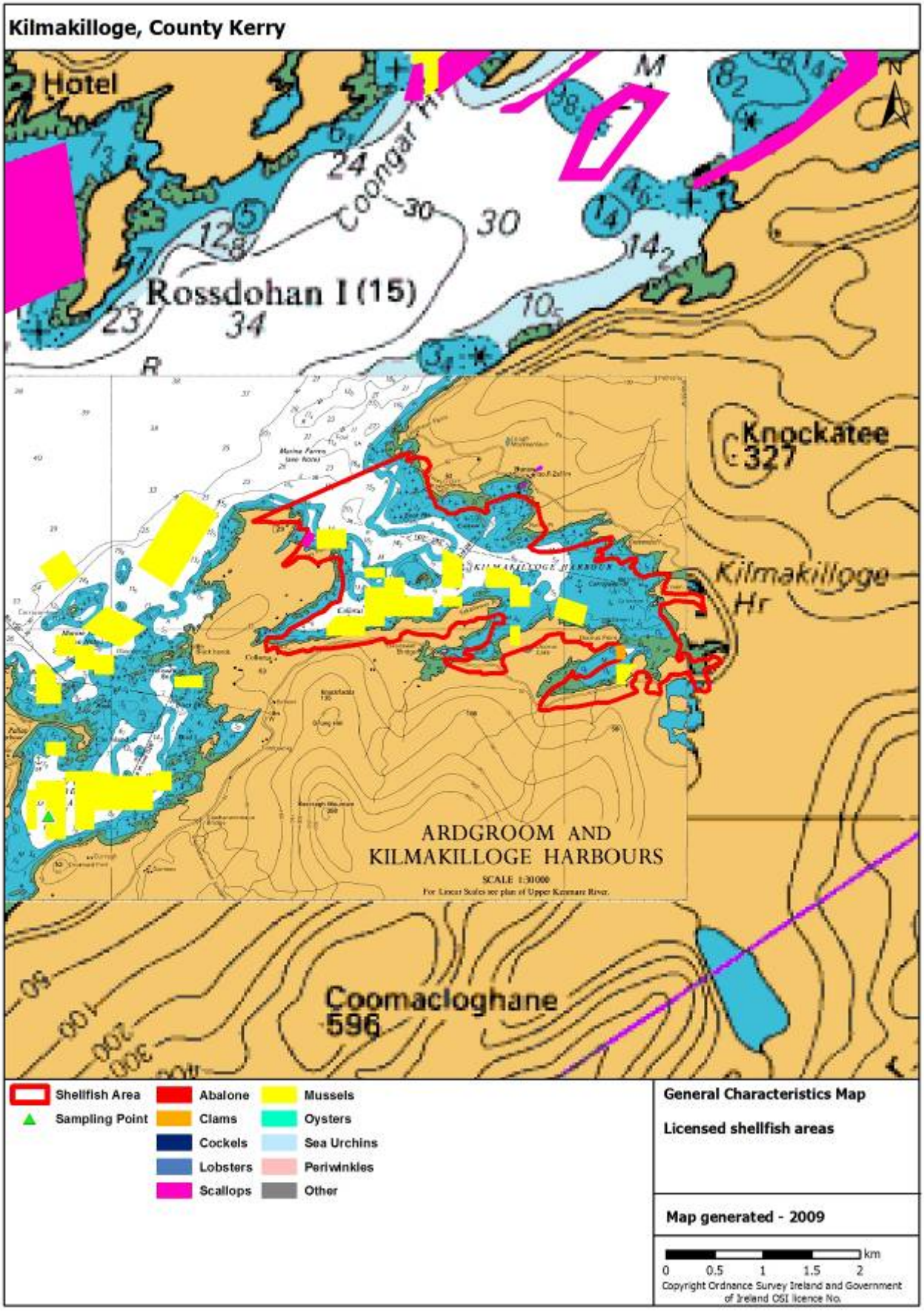
Map No.	Map Title	Details
MAP 7	Vulnerability of groundwaters to phosphorus from subsoil discharges	Potential risk of phosphorus from sub-soils discharges reaching groundwaters. Based on vulnerability, presence of alluvium, mineral content of soils, wetness, aquifer type, subsoil depth and subsoil permeability.
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		

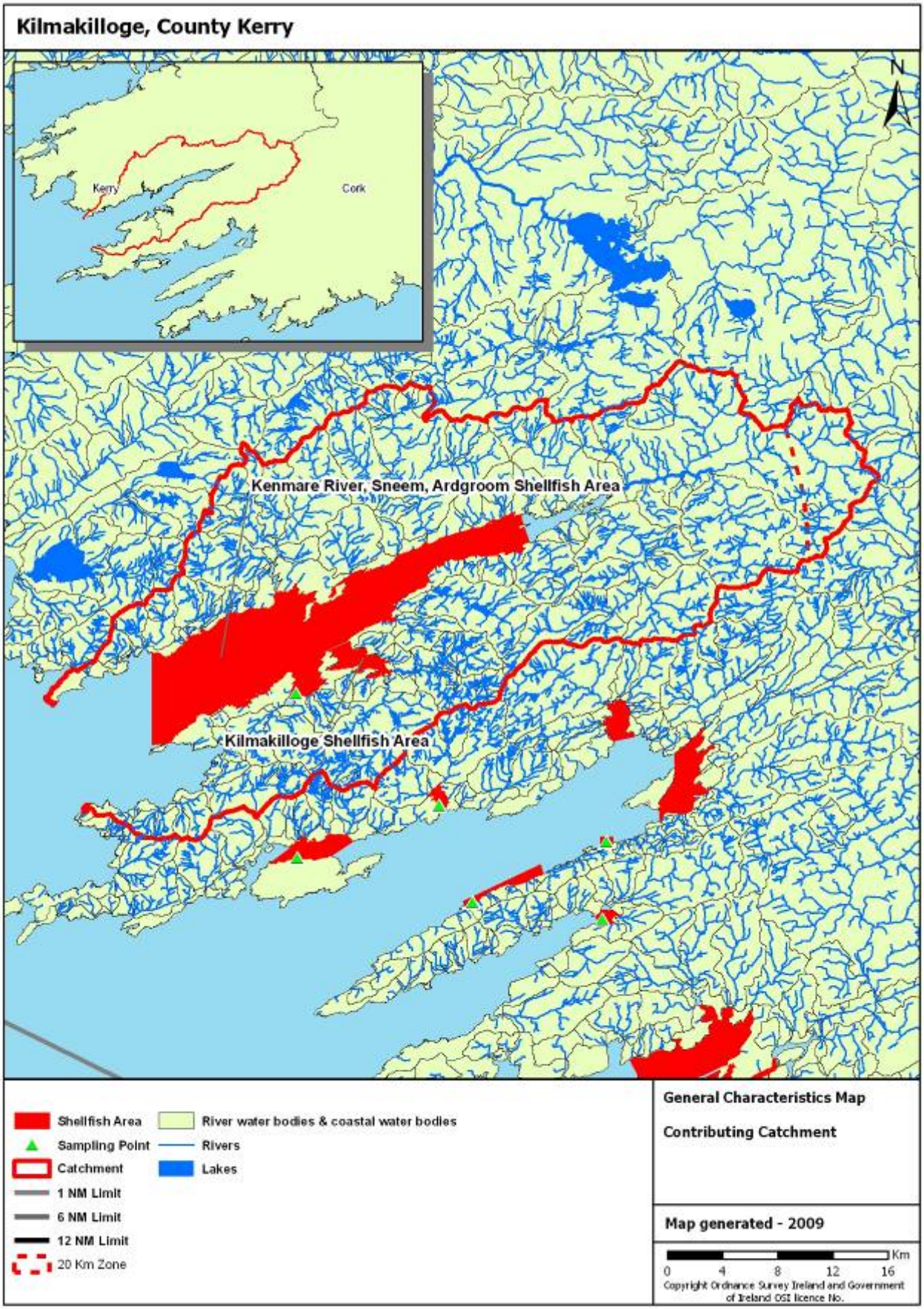
Map No.	Map Title	Details
MAP 28	Structures	Barriers to migration, both natural and man-made in the contributing catchment.
MAP 29	Physical modifications	Channelisation, heavily modified and artificial water bodies in the contributing catchment.

MAP 1 - Designated shellfish area

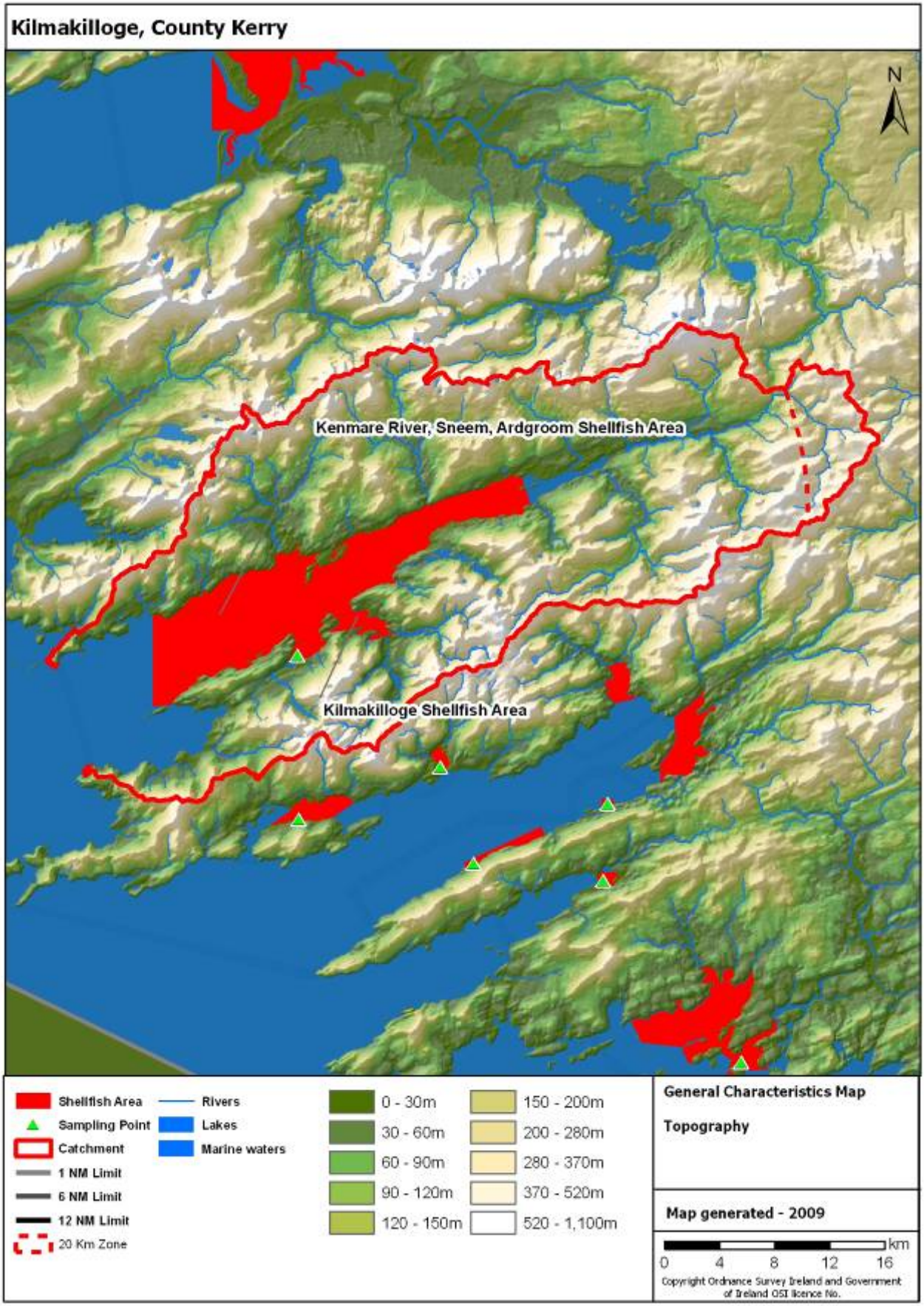
MAP 2 - Licensed shellfish areas



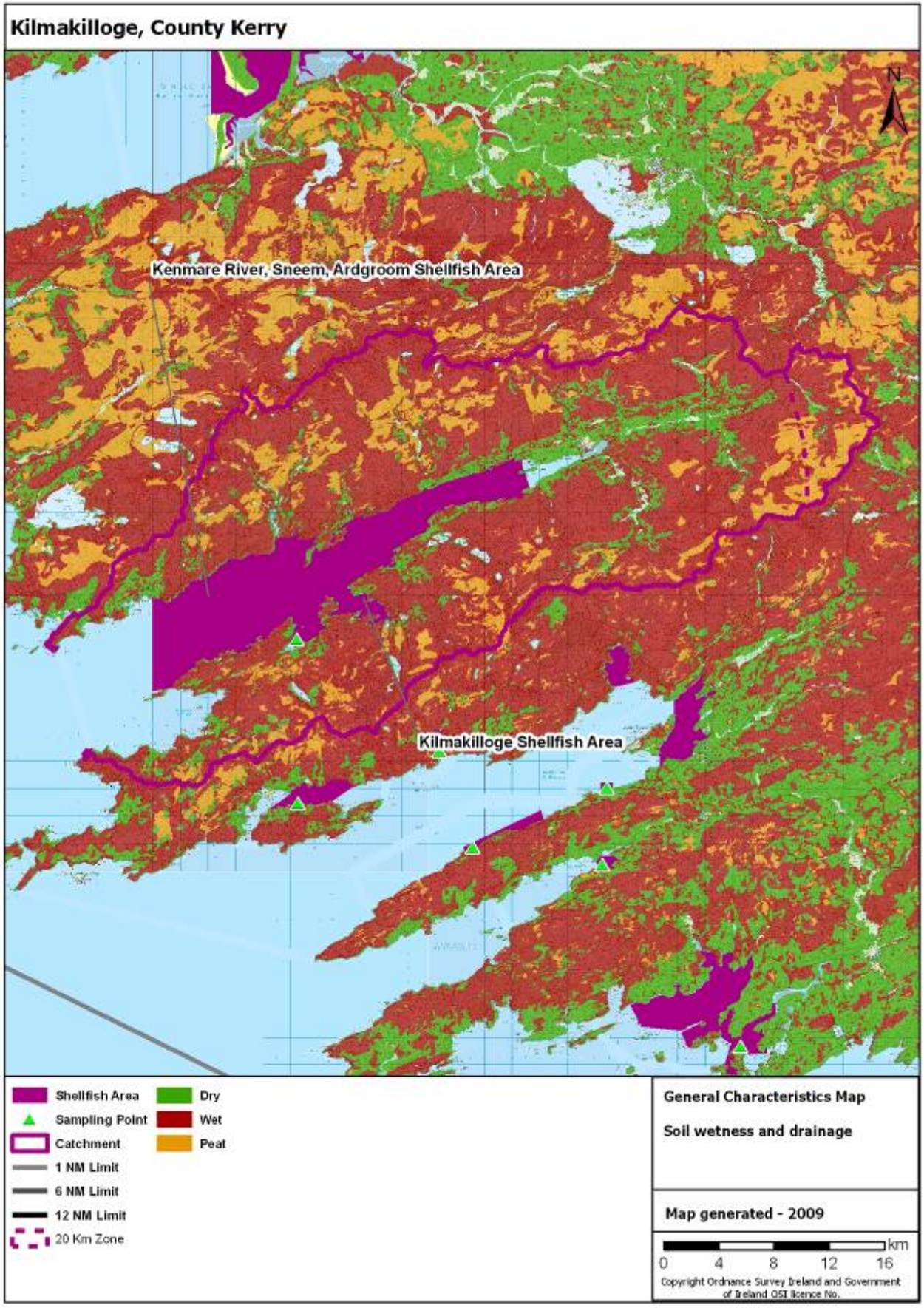
MAP 3 - Contributing catchment



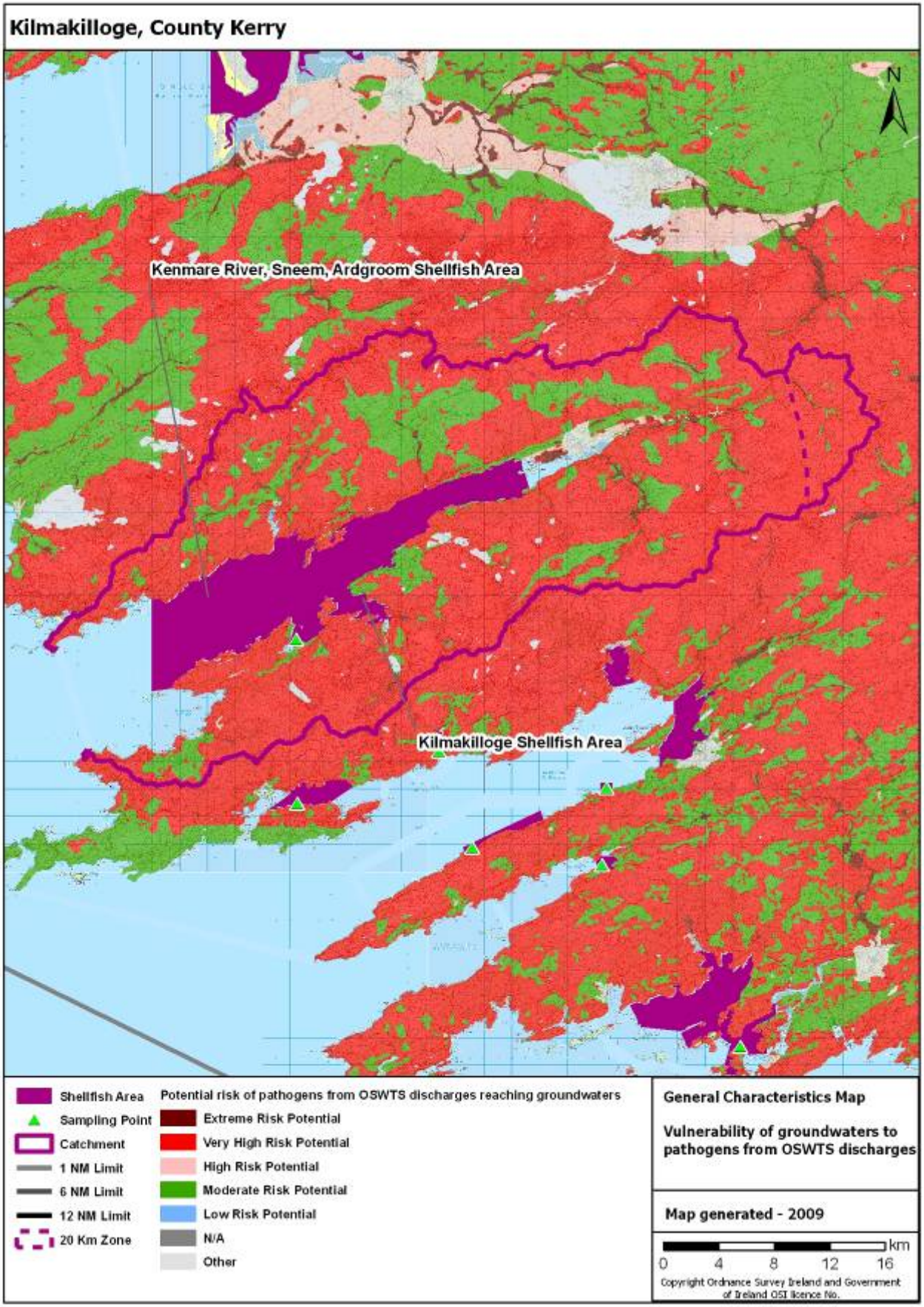
MAP 4 – Topography



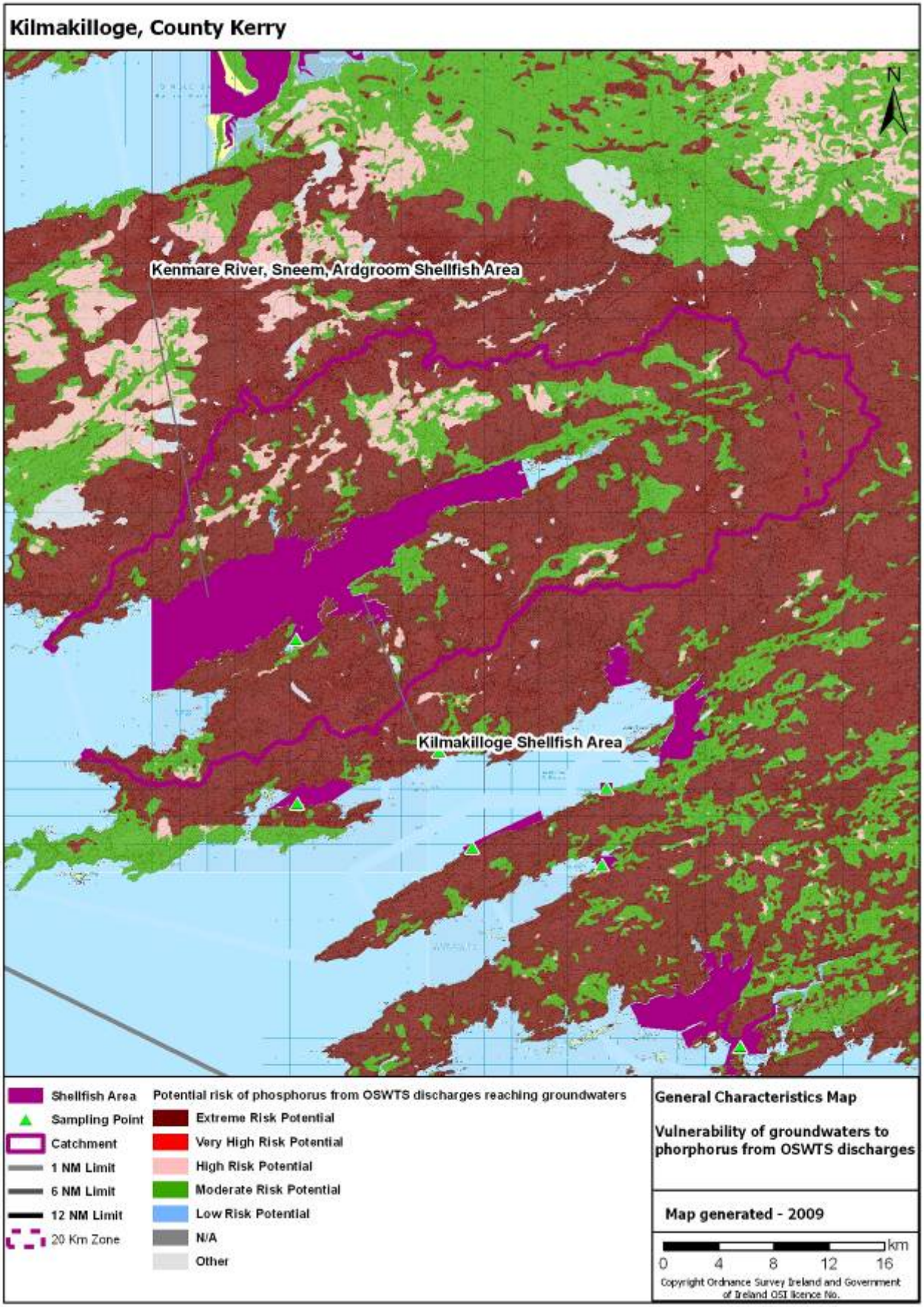
MAP 5 - Soil wetness



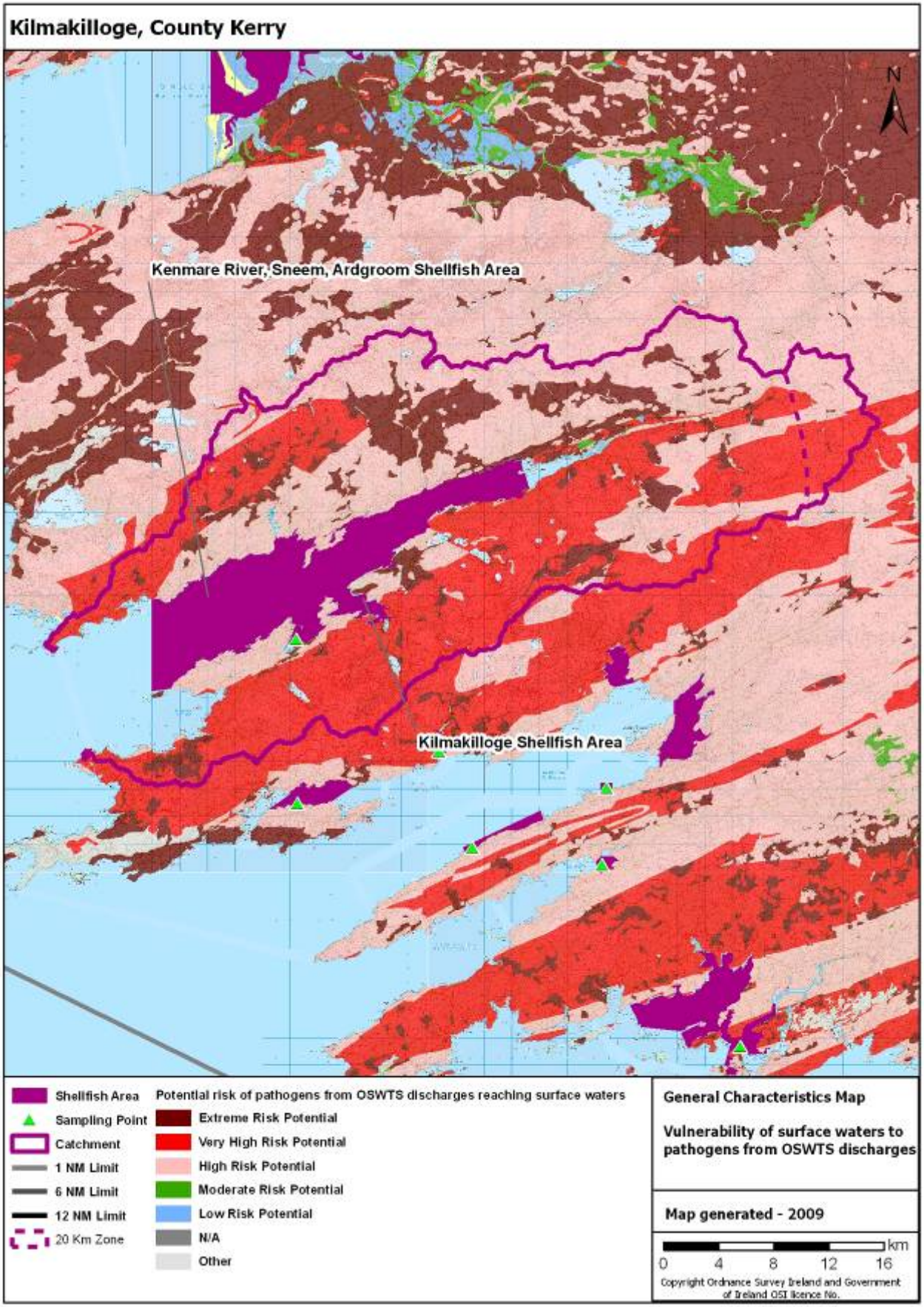
MAP 6 - Vulnerability of groundwater to pathogens from subsoil discharges



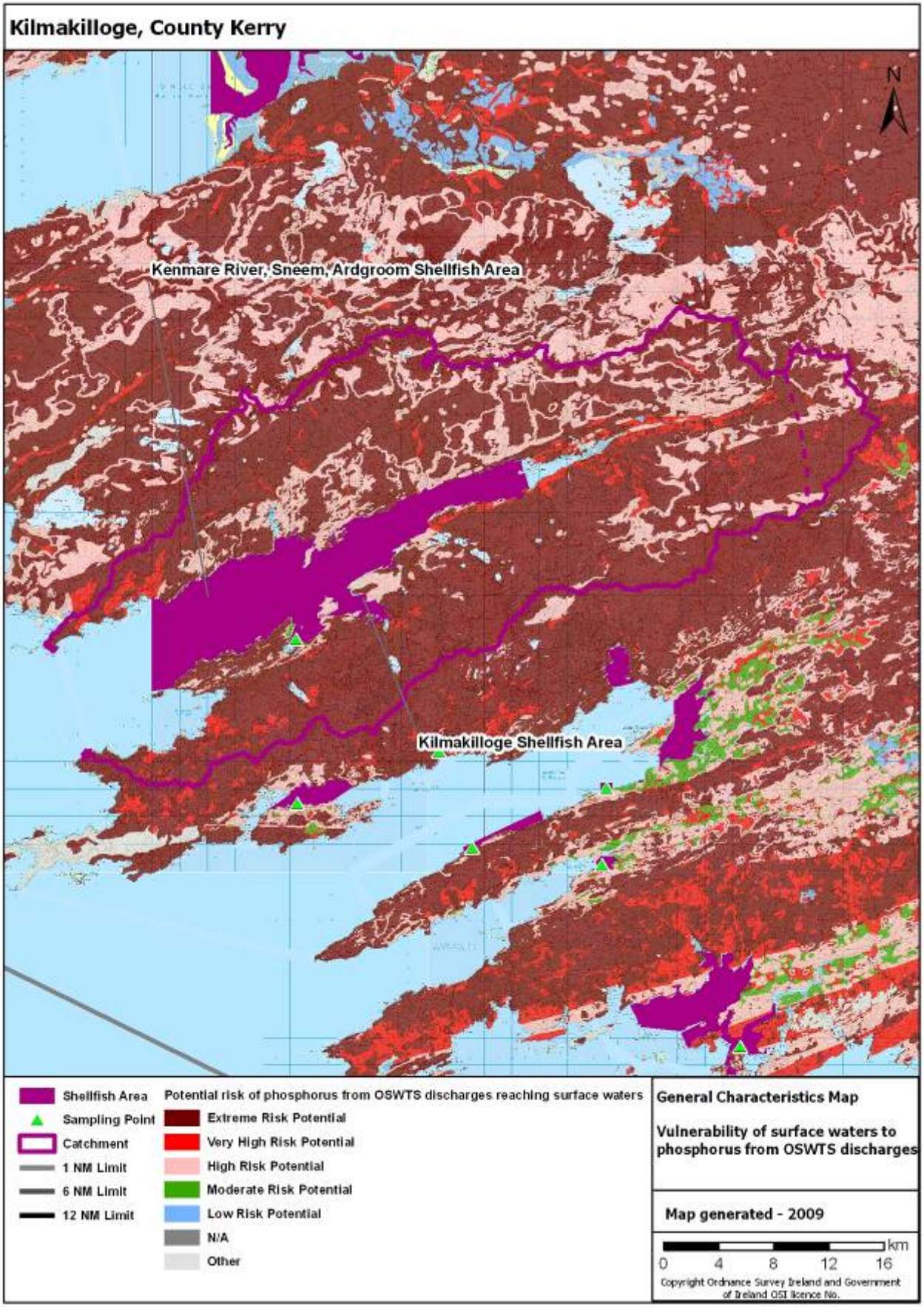
MAP 7 - Vulnerability of groundwater to phosphorus from subsoil discharges



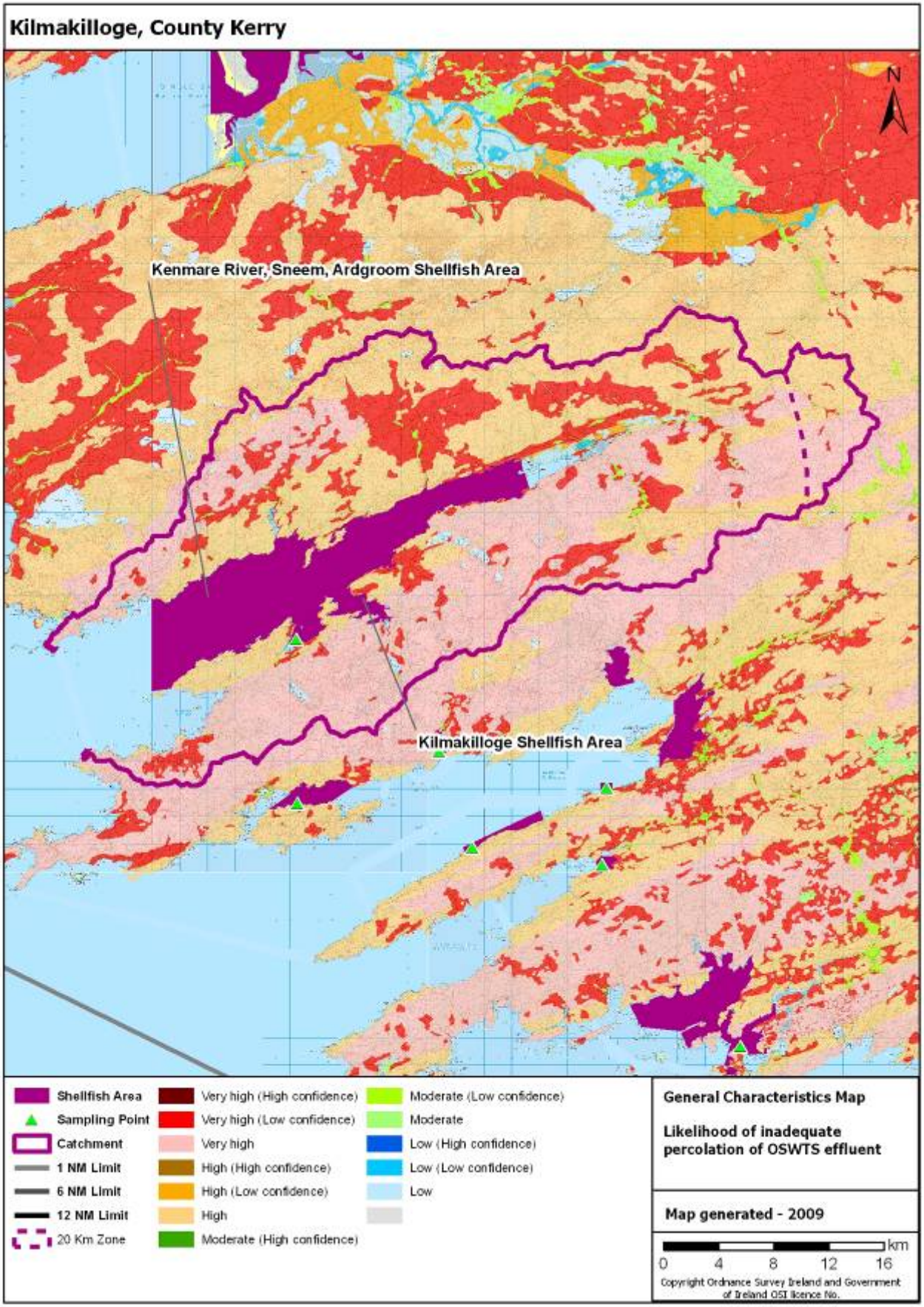
MAP 8 - Vulnerability of surface waters to pathogens from subsoil discharges



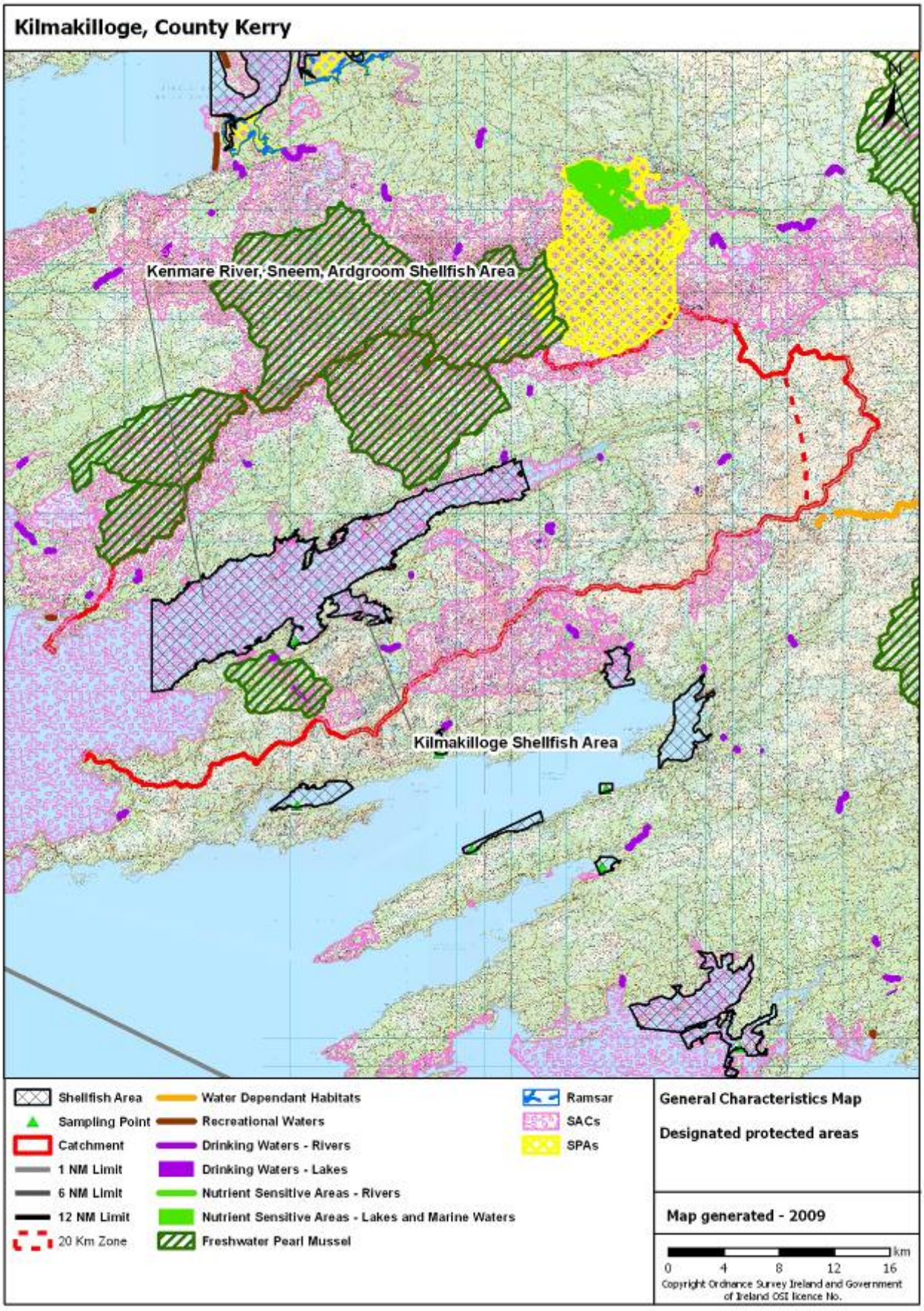
MAP 9 - Vulnerability of surface waters to phosphorus from subsoil discharges



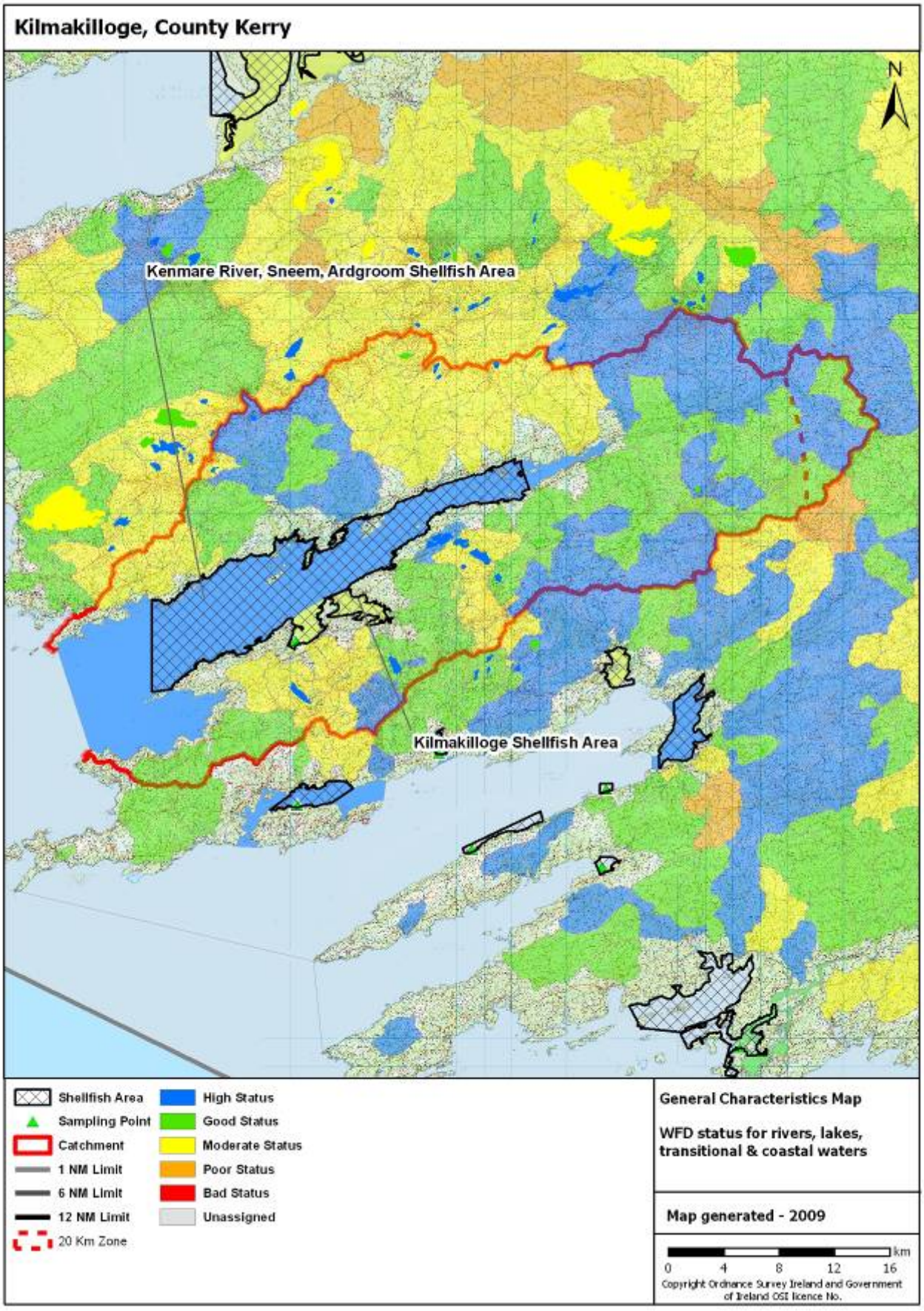
MAP 10 - Likelihood of inadequate percolation in sub-soils



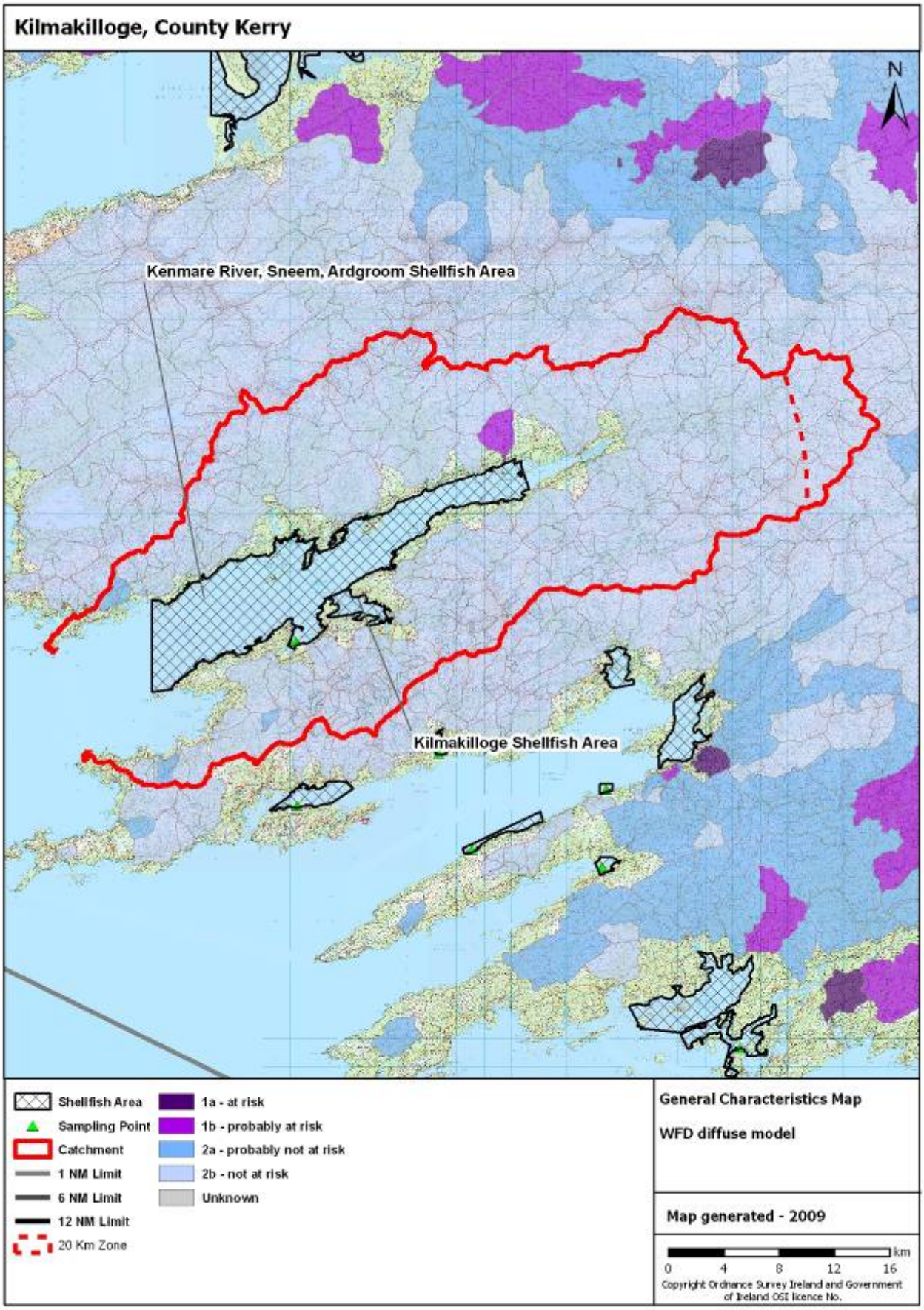
MAP 11 - Designated protected areas



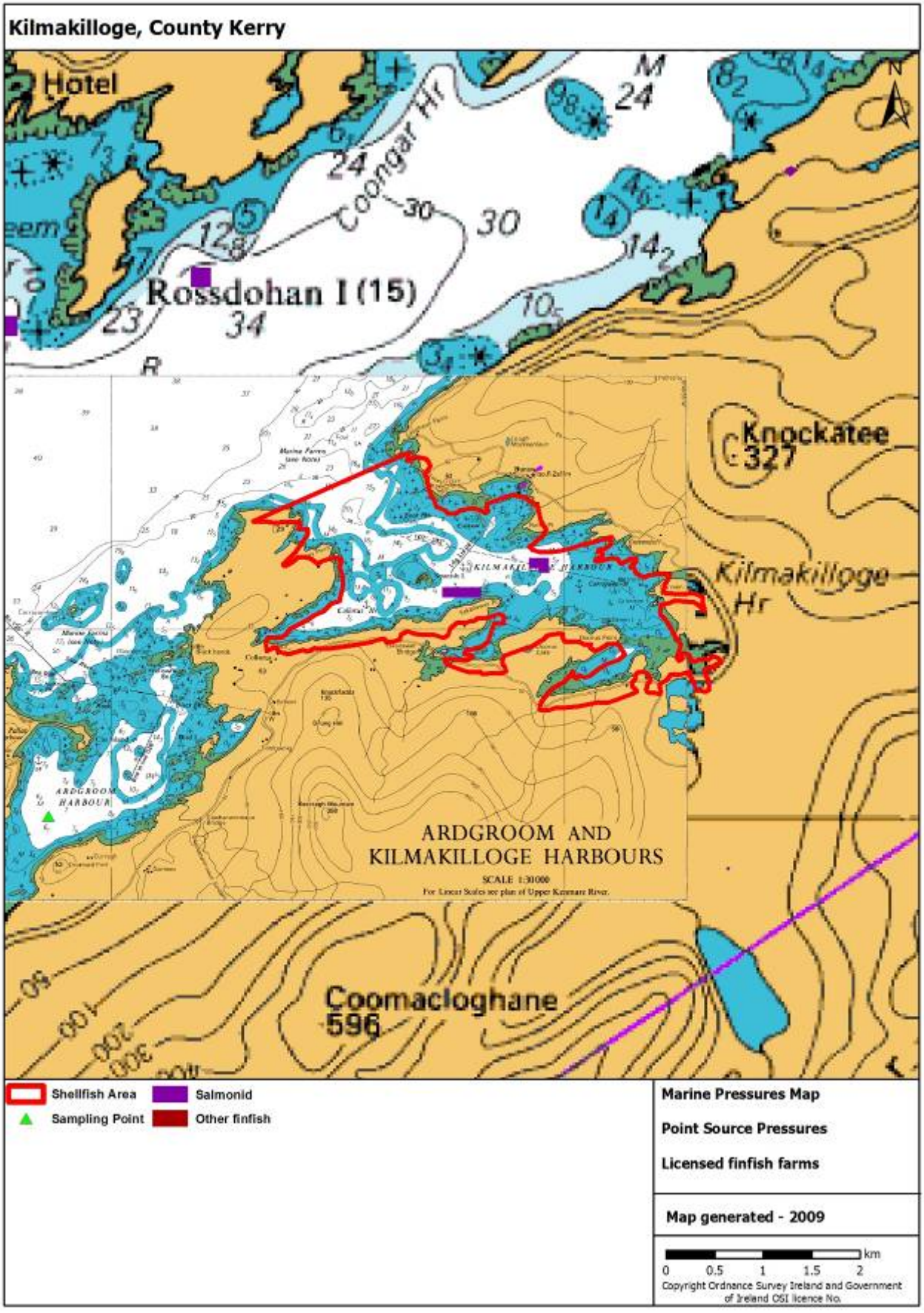
MAP 12 - WFD surface water status



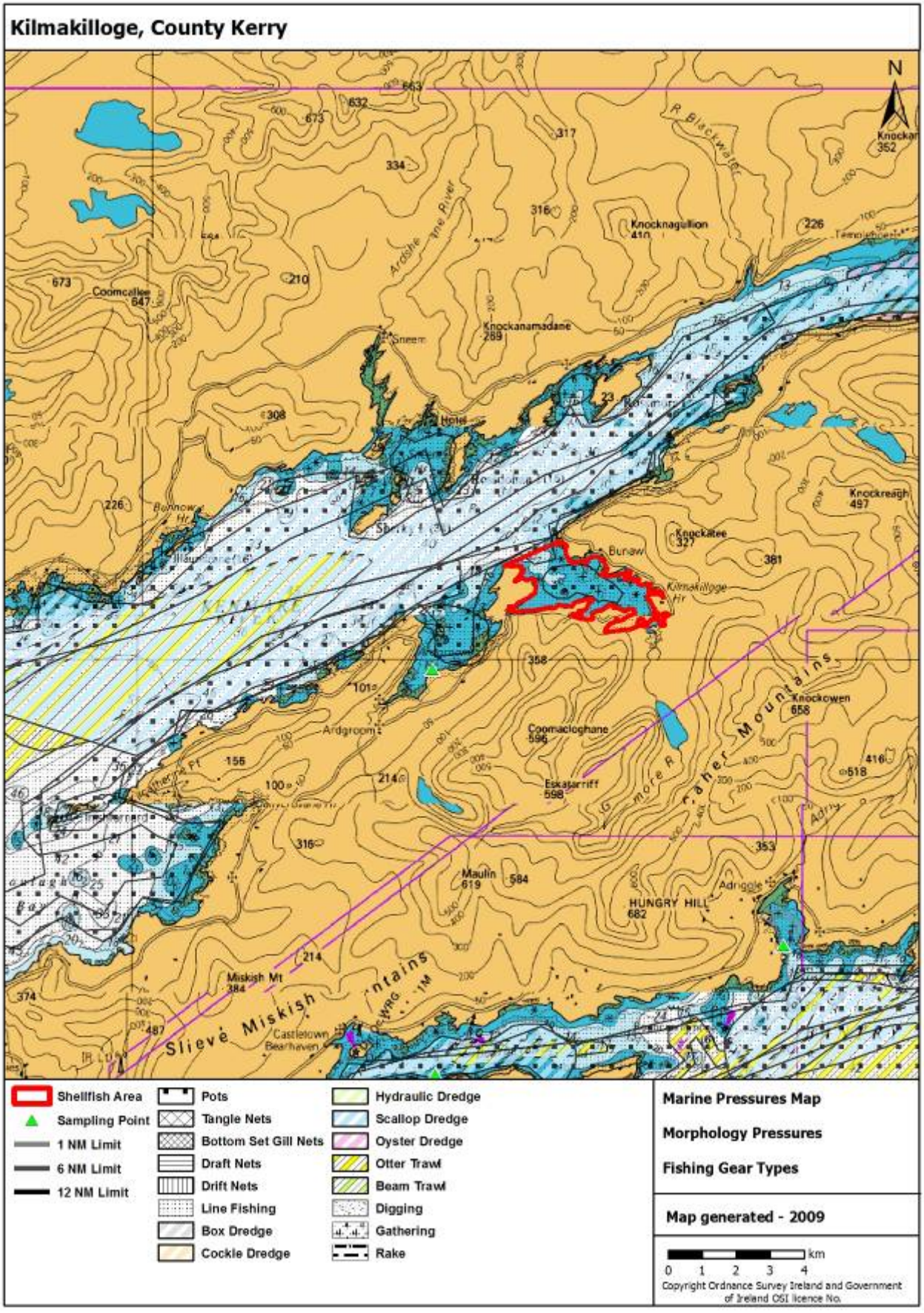
MAP 13 - Diffuse risk assessment



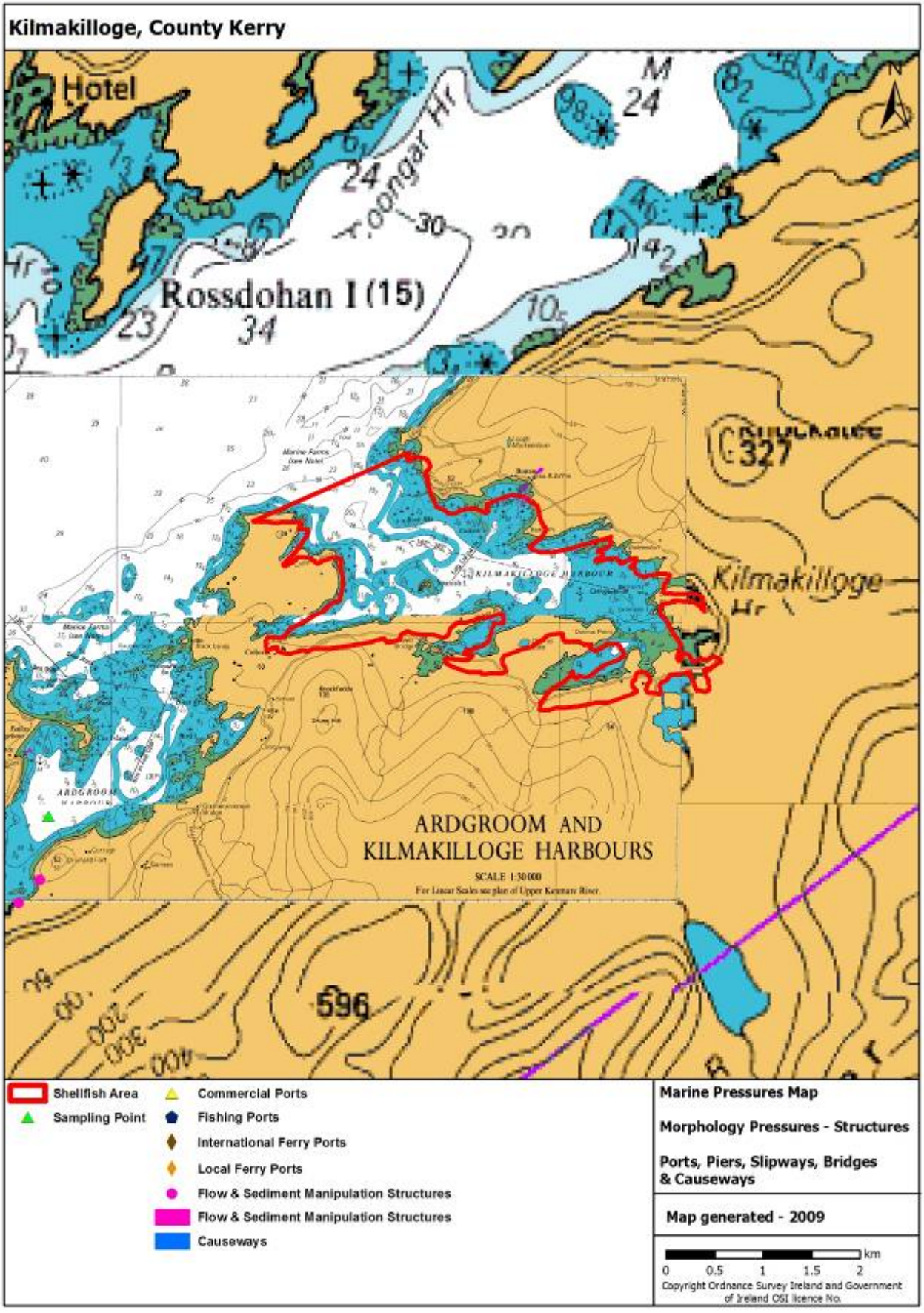
MAP 14 - Licensed finfish areas



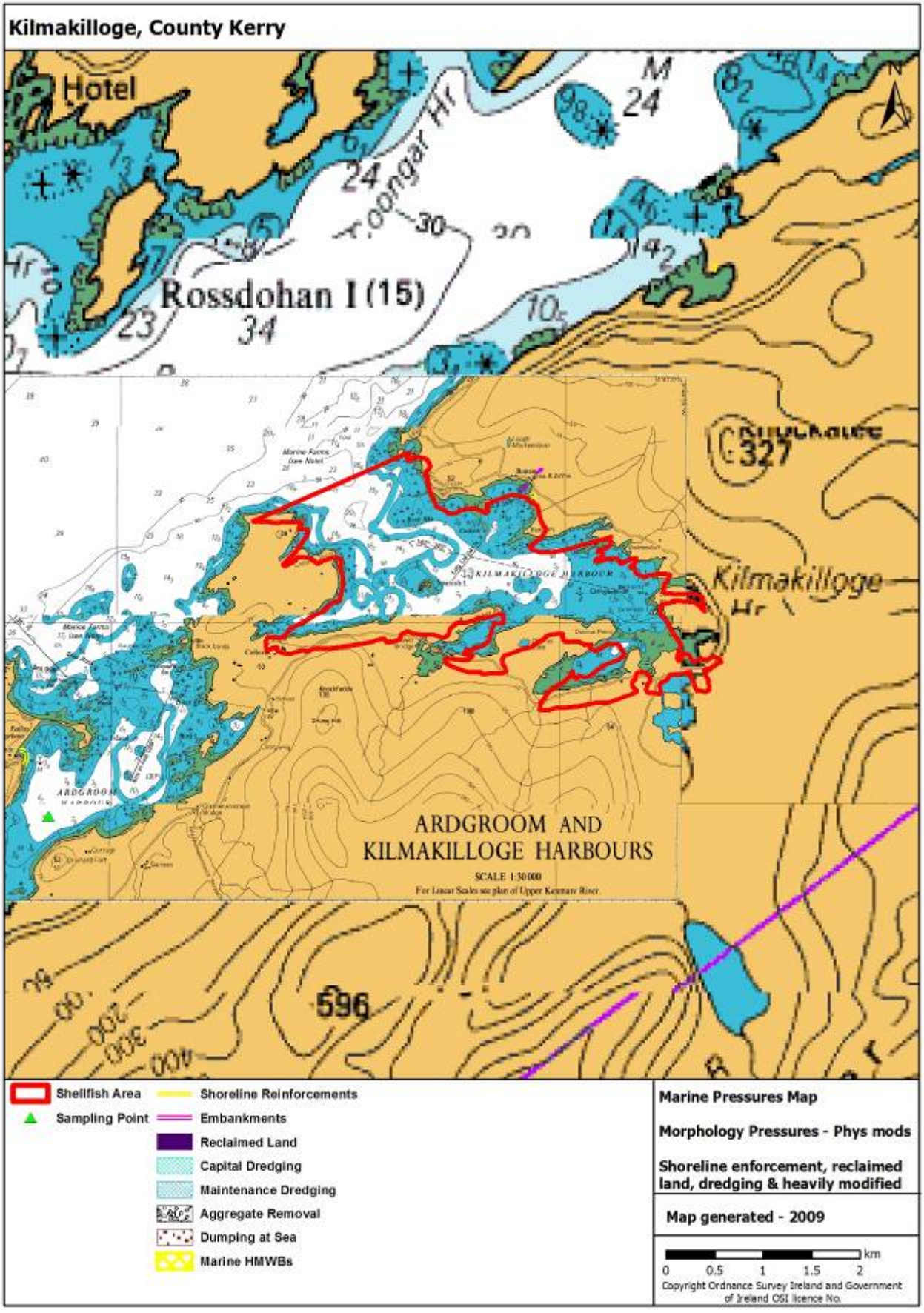
MAP 15 - Fishing gear activity



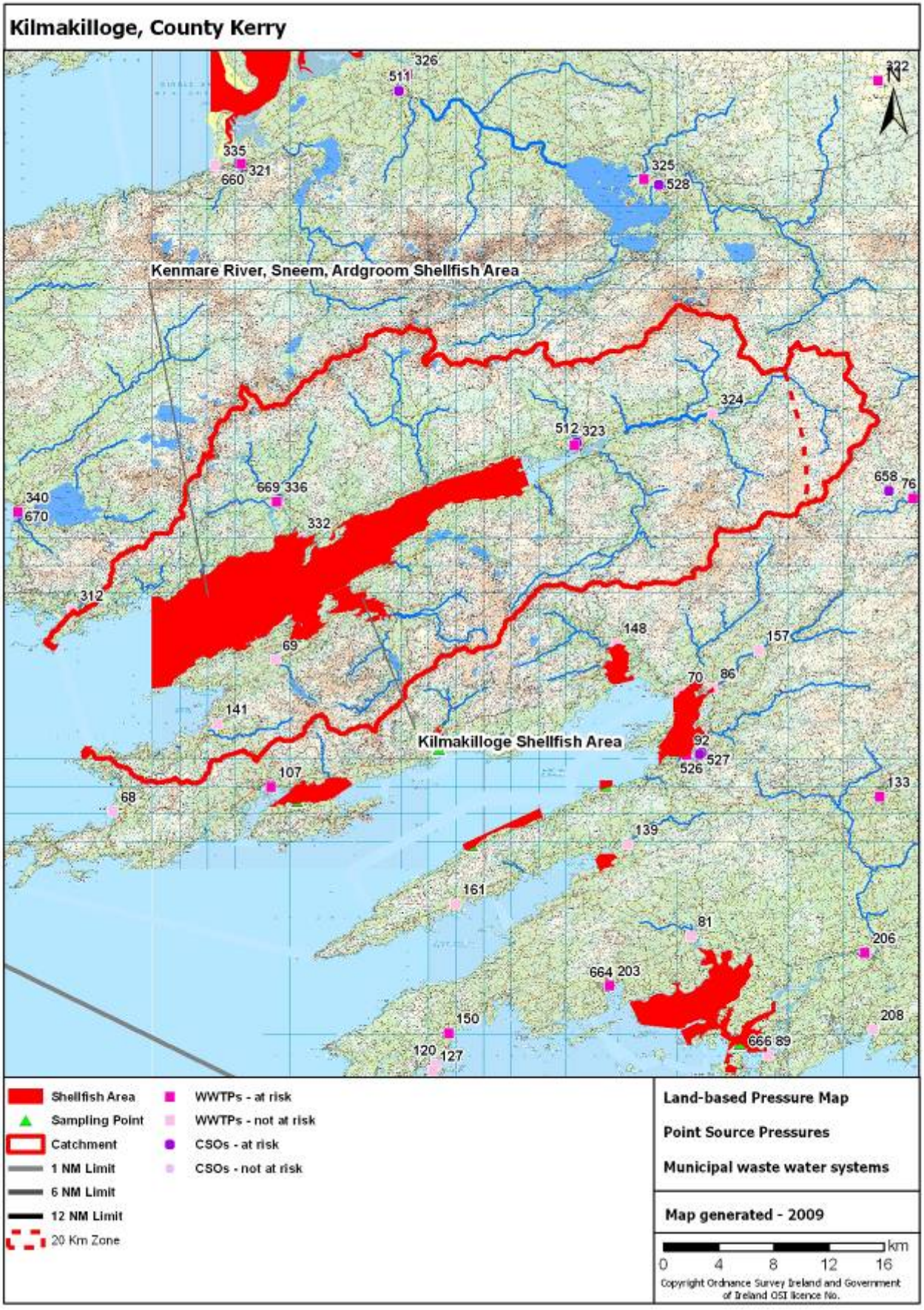
MAP 16 - Marine structures



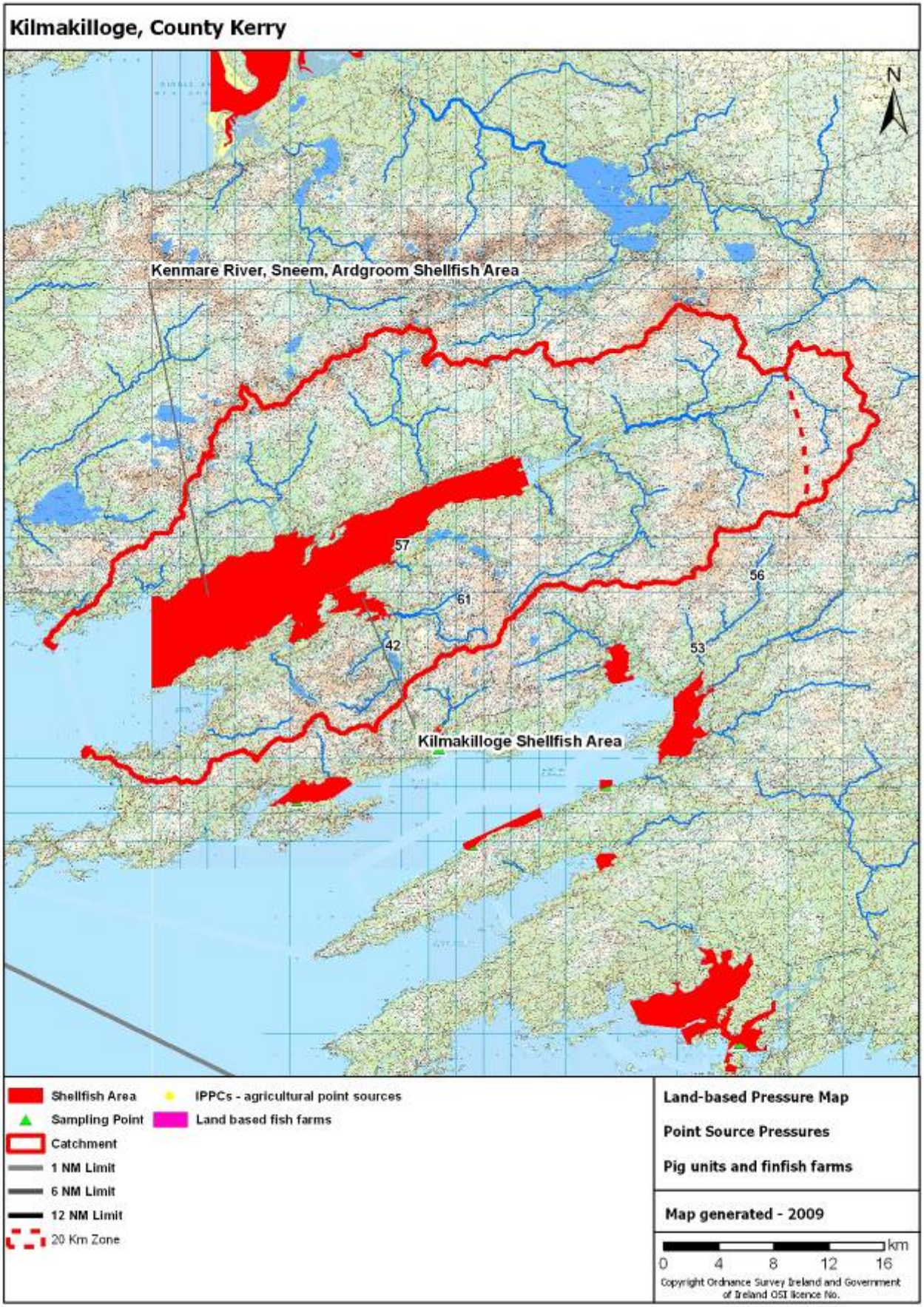
MAP 17 - Marine physical modifications



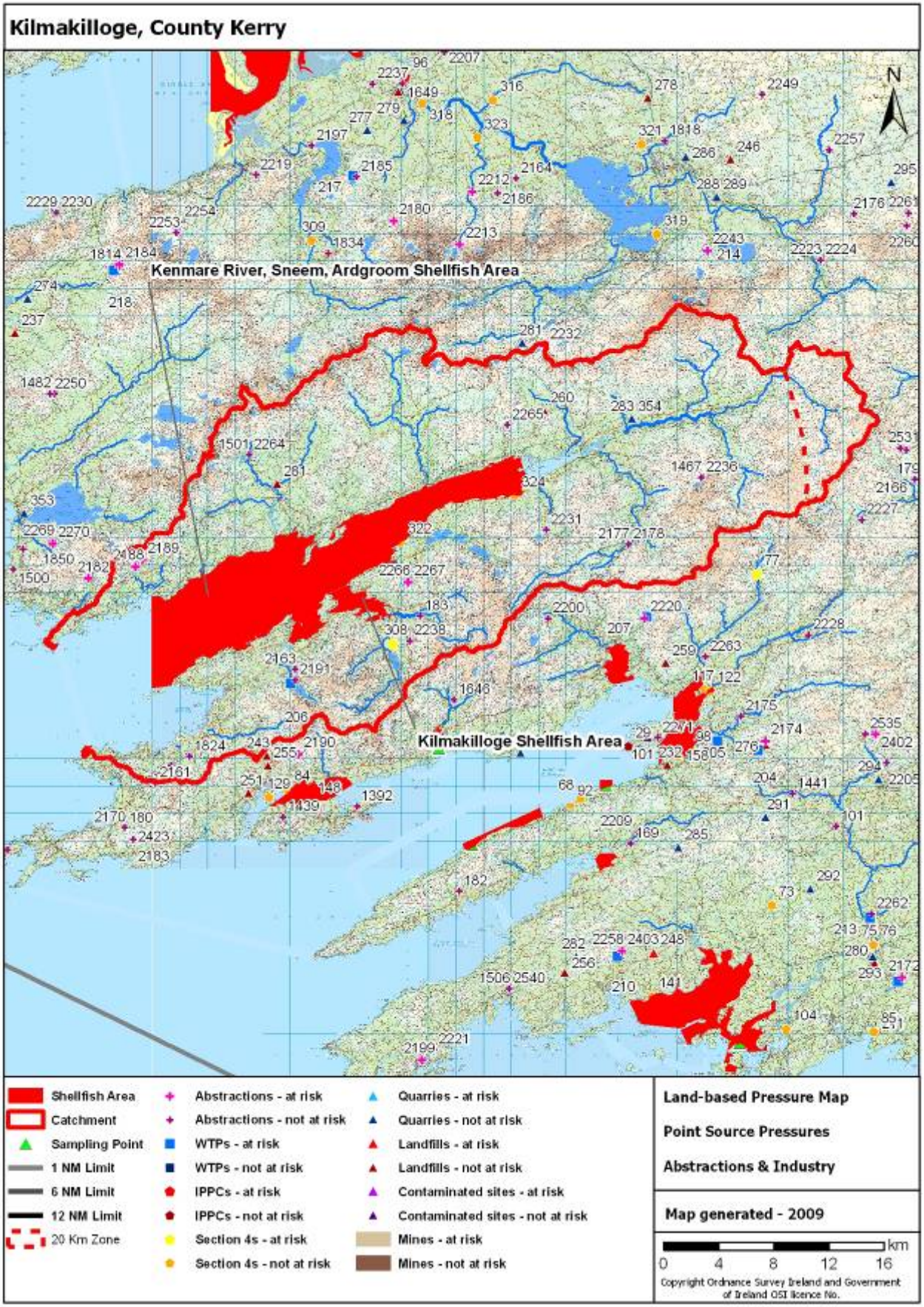
MAP 18 - Municipal waste water systems



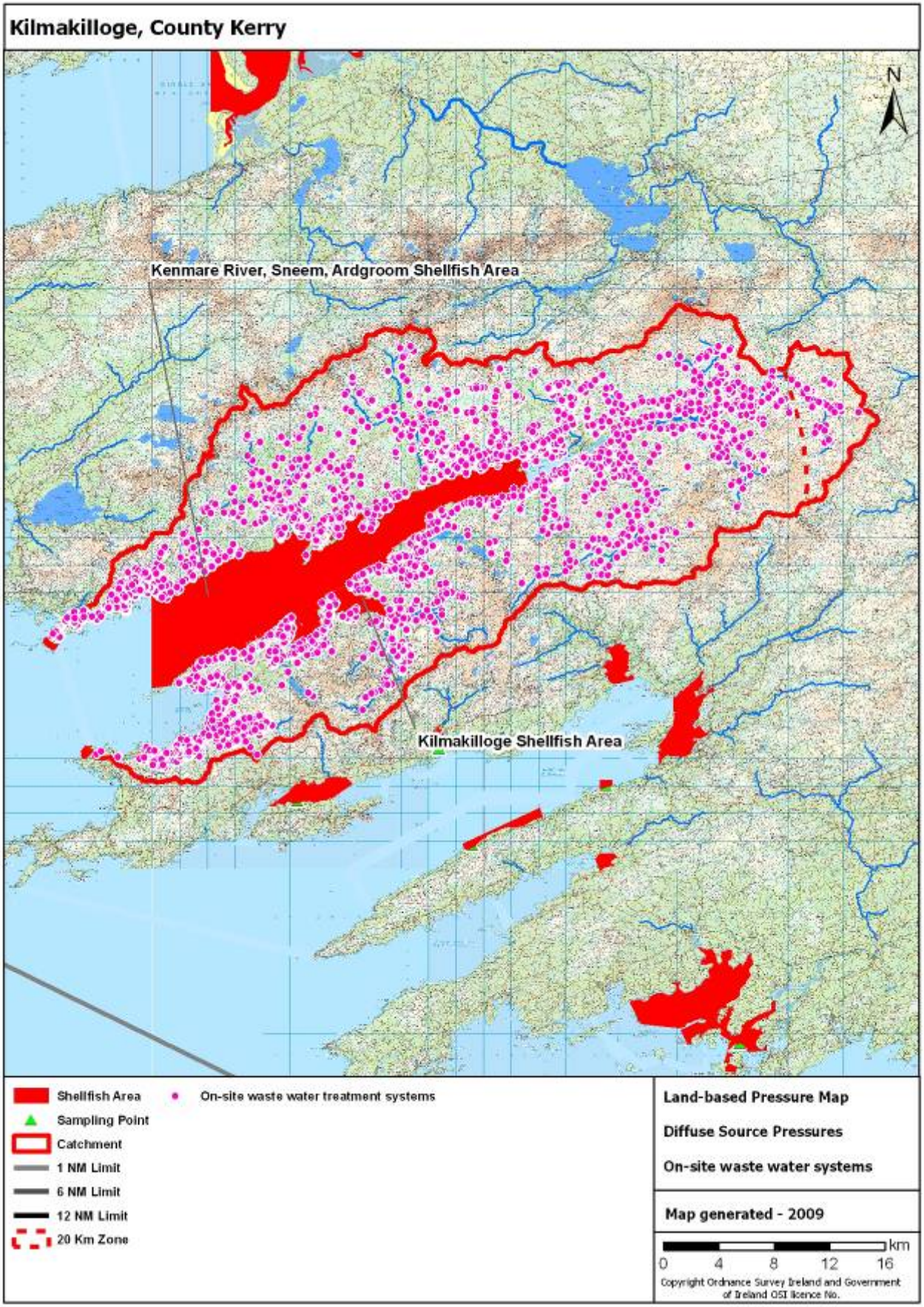
MAP 19 - Pig units and finfish farms



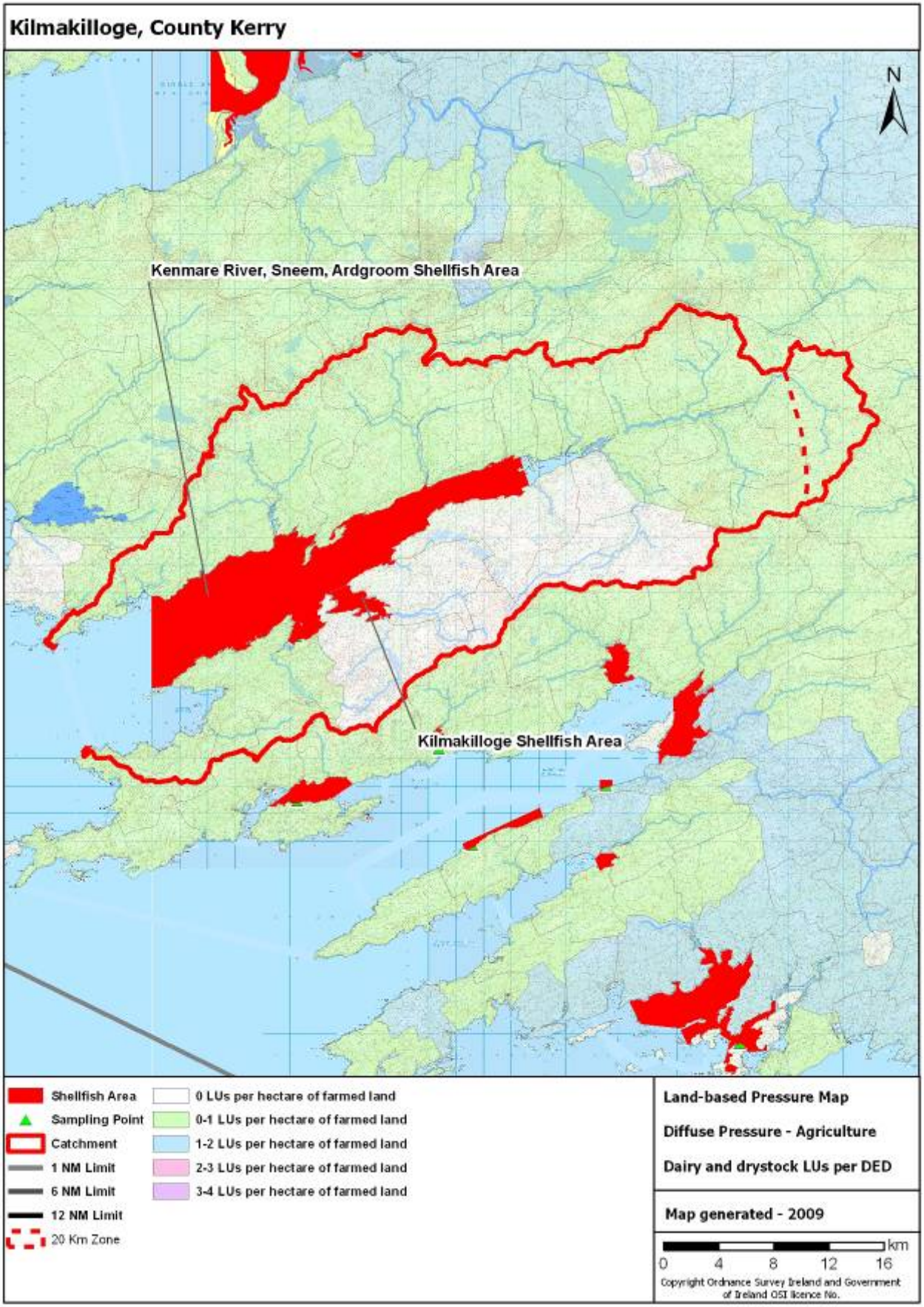
MAP 20 - Industrial point source pressures



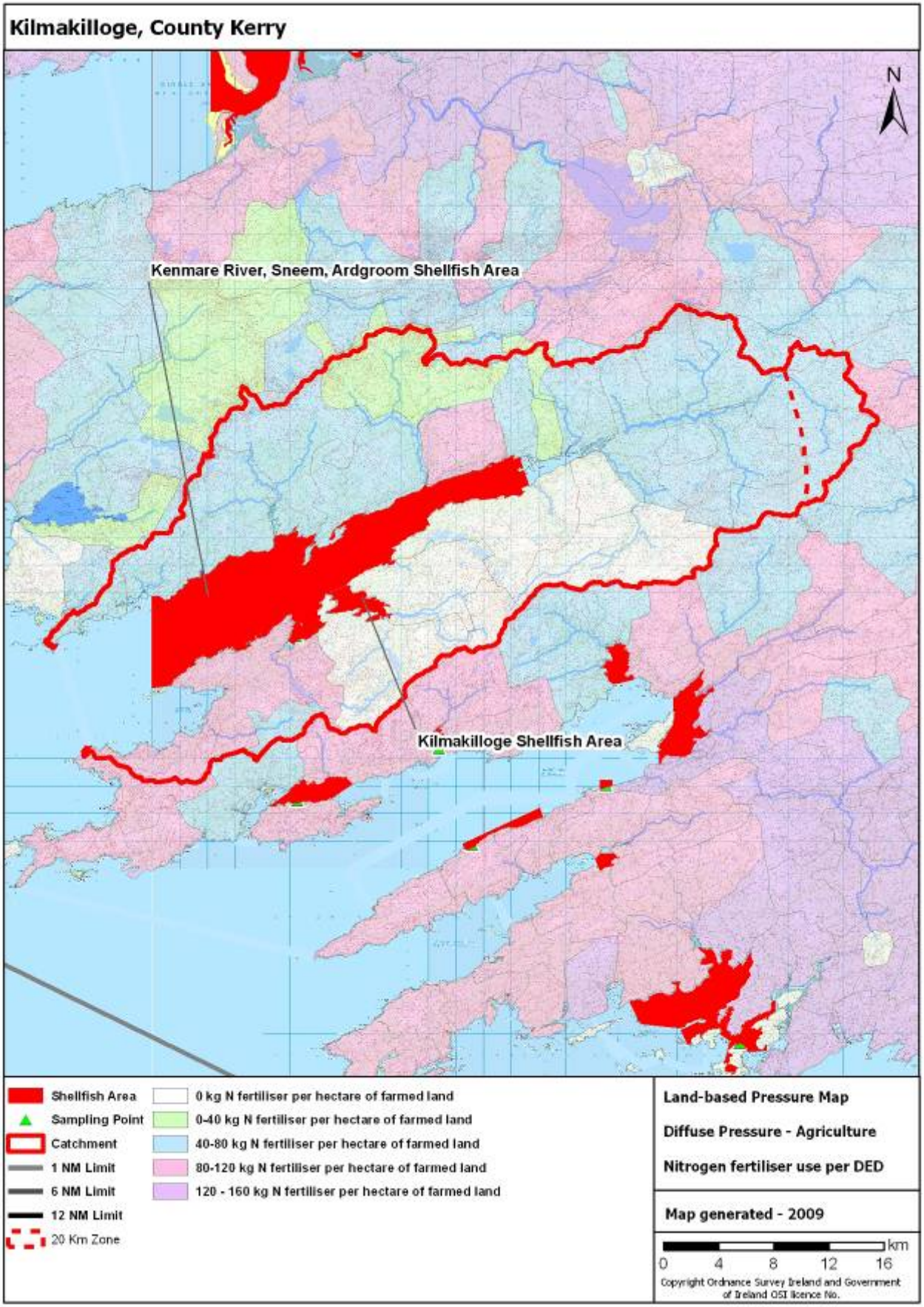
MAP 21 - On-site waste water systems



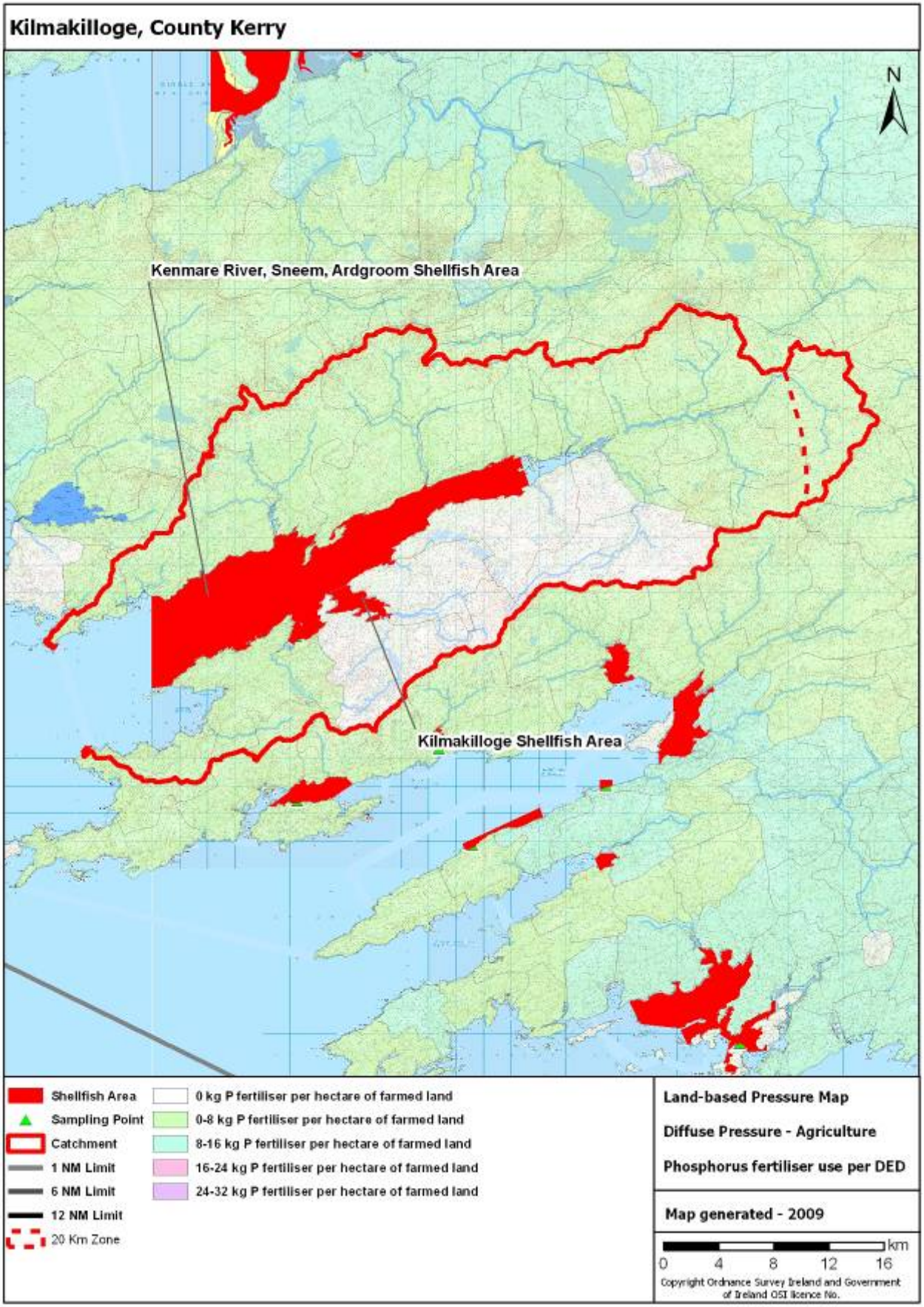
MAP 22 - Dairy and drystock livestock units



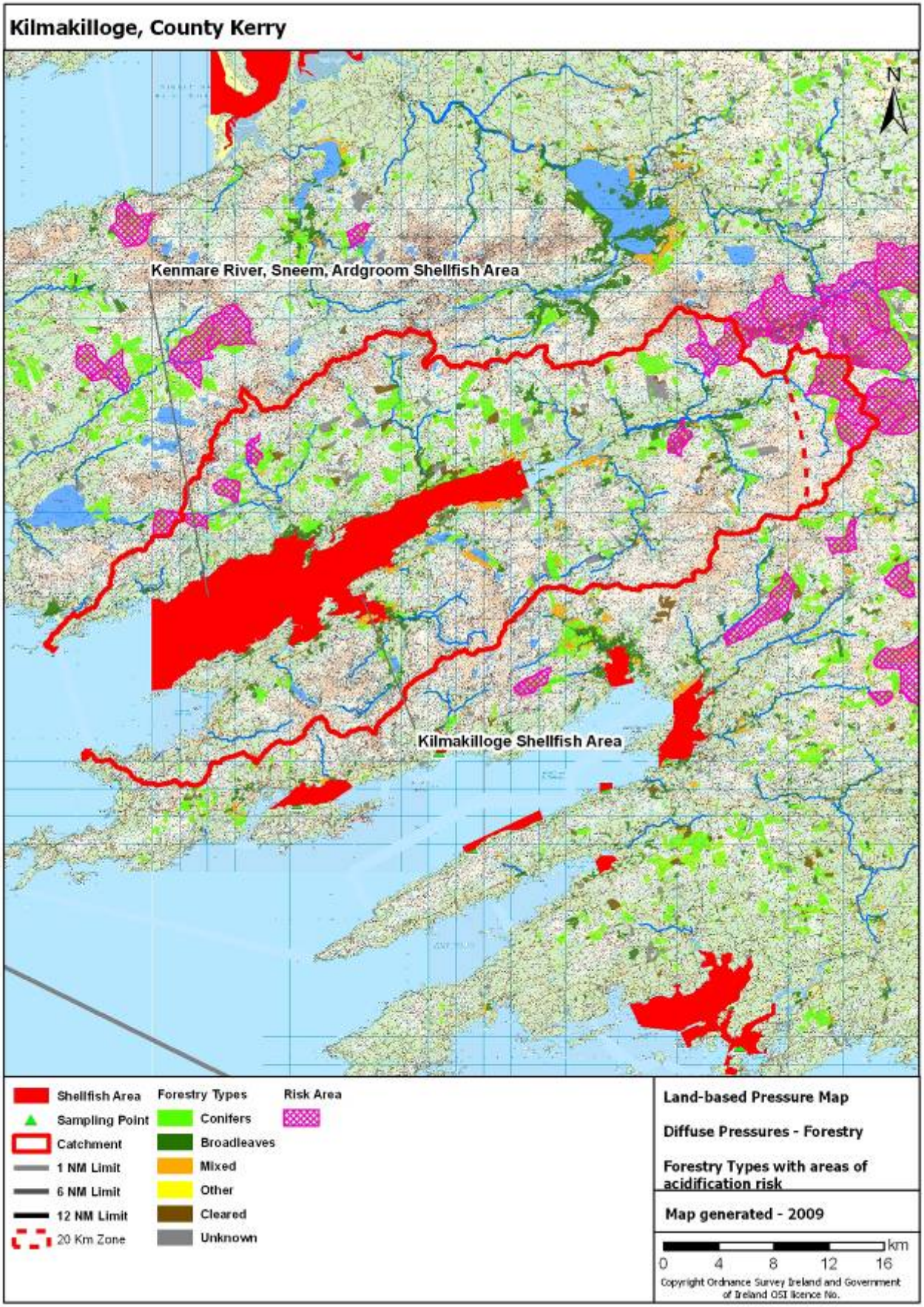
MAP 23 - Nitrogen fertiliser usage



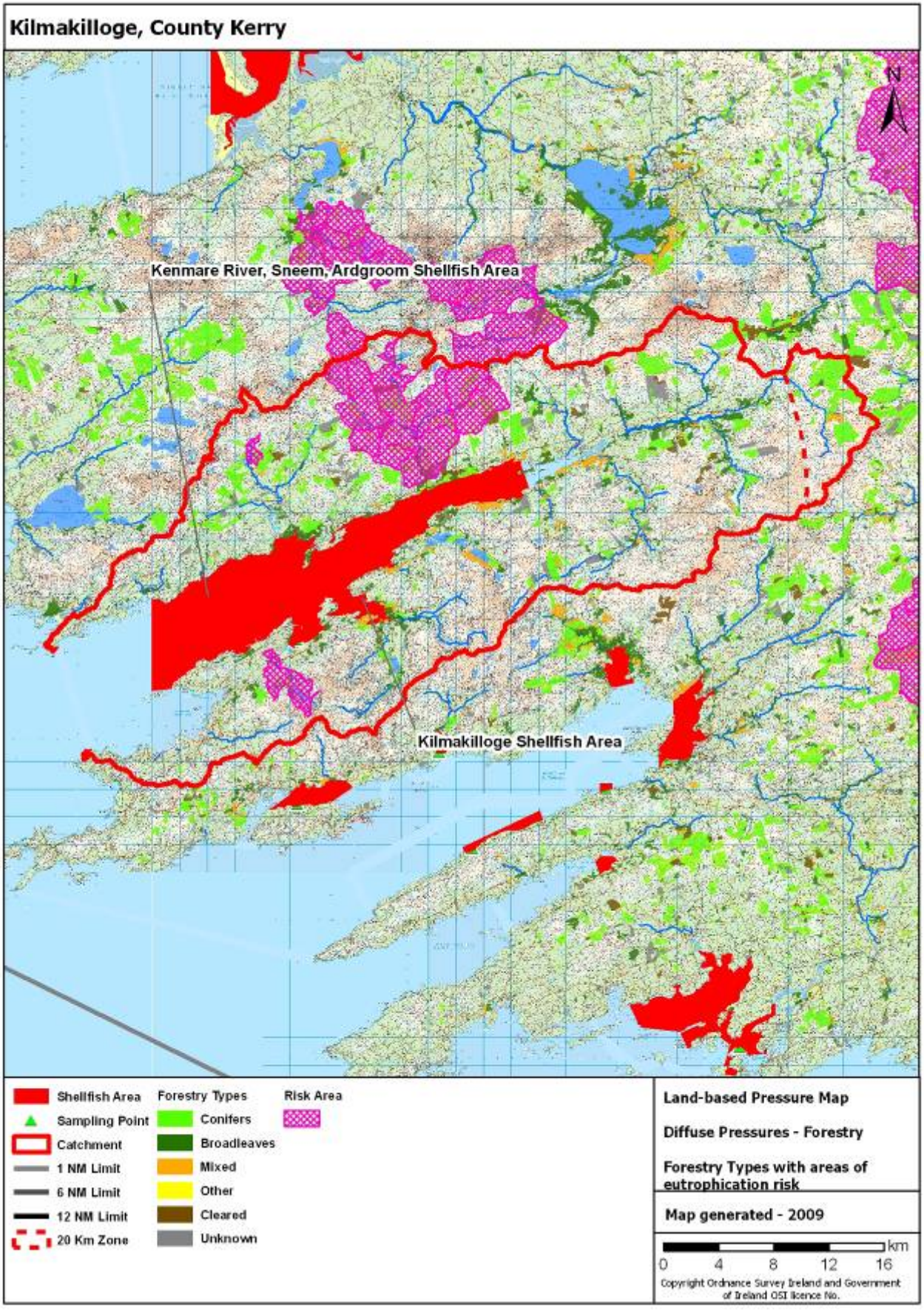
MAP 24 - Phosphorus fertiliser usage



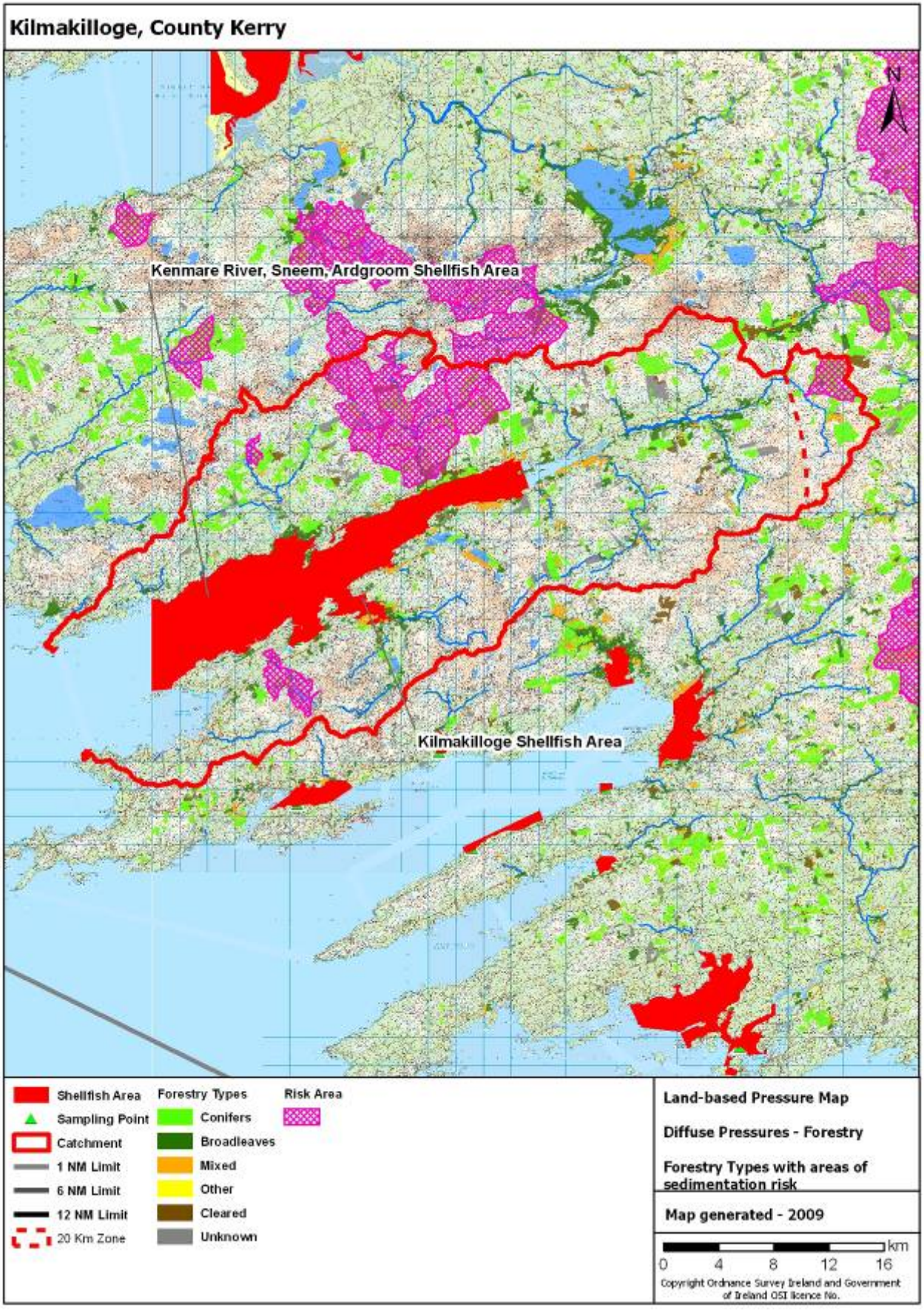
MAP 25 - Forestry types with acidification risk areas



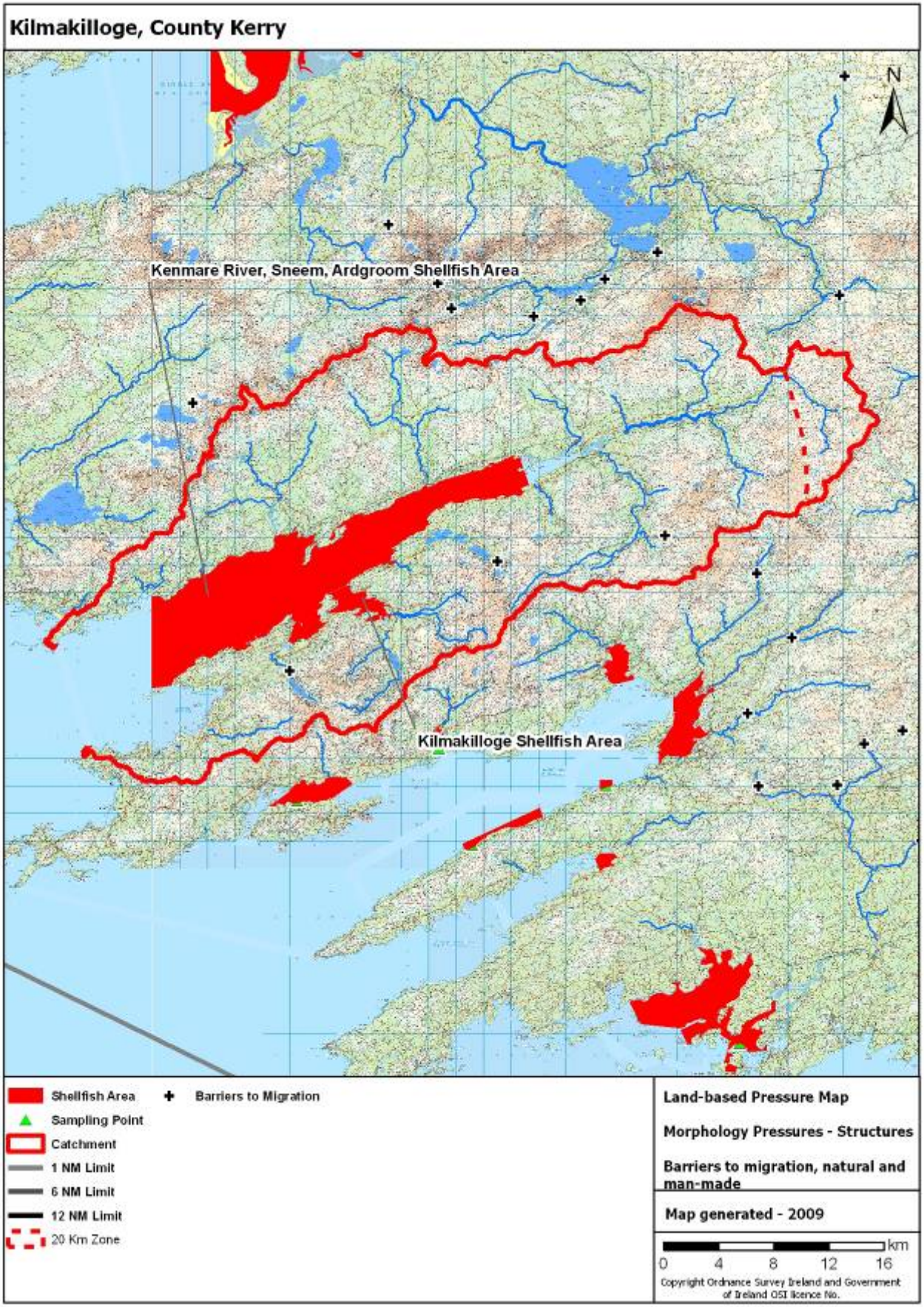
MAP 26 - Forestry types with eutrophication risk areas



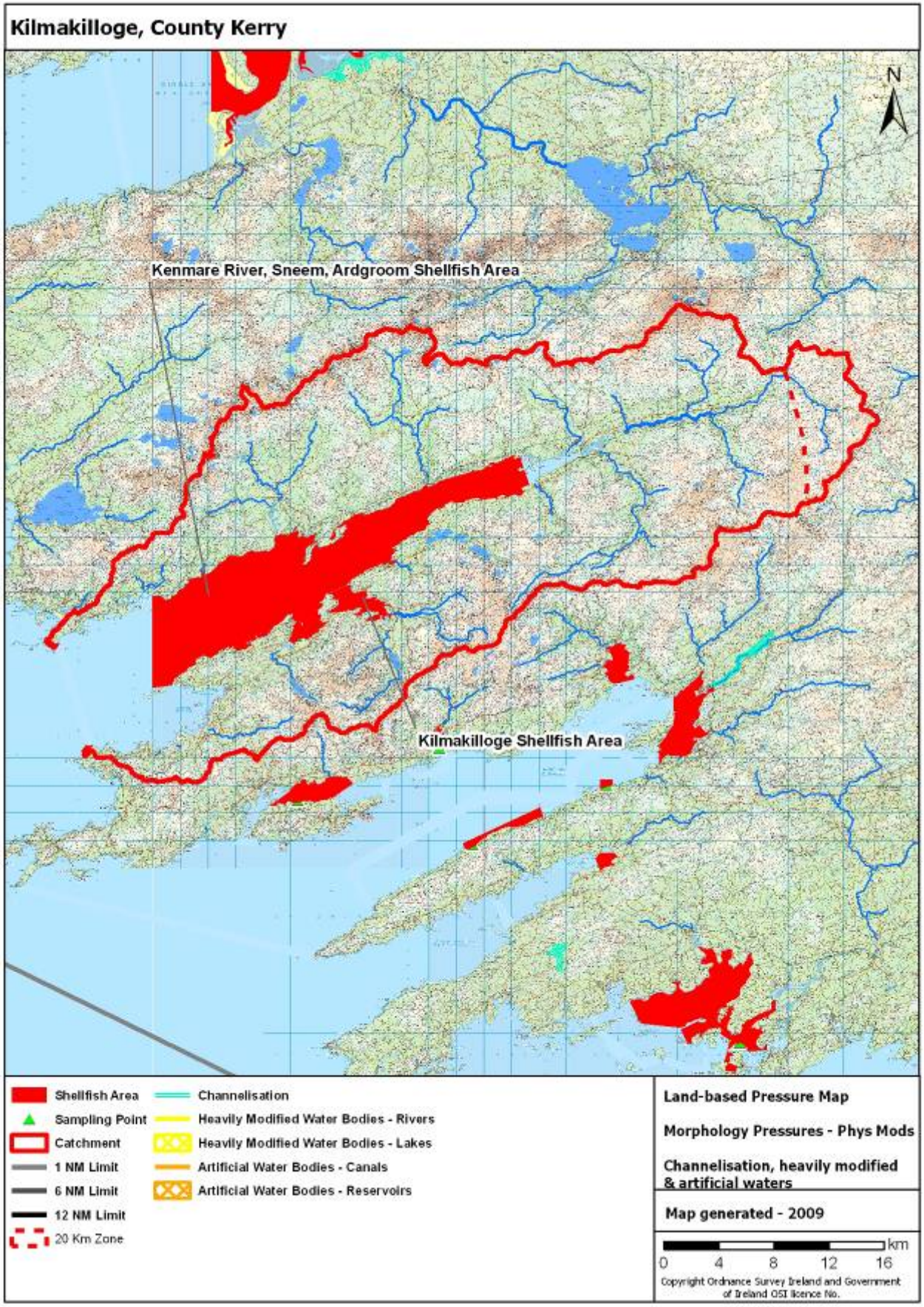
MAP 27 - Forestry types with sedimentation risk areas



MAP 28 - Freshwater structures



MAP 29 - Freshwater physical modifications (None in this catchment)



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.ie.

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.

Table 4 lists all of the pressures considered in the development of the characterisation report and indicates their presence or absence 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**	**Yes**
	Morphology	**Fishing gear activity**	**Yes**
		Structures and associated activities	
		Ports	No
		Flow/Sediment manipulation structures	**Yes**
		Piled structures	**Yes**
		Causeways	No
		Physical modifications	
		Shoreline reinforcement	**Yes**
		Embankments	No
		Reclaimed Land	No
		Capital dredging	No
		Maintenance dredging	No
		Aggregate removal	No
		Disposal at sea	No
		Marine heavily modified waters	No
Land-based	Point	Municipal waste water systems	
		Urban waste water treatment systems	**Yes**
		Combined sewer overflows	**Yes**
		Agricultural and aquacultural point sources	
		Pig units	No
		Freshwater finfish farms	**Yes**
		Industrial point sources	
		Abstractions	**Yes**
		Water treatment plants	**Yes**
		IPPCs	No
		Section 4s	**Yes**
		Quarries	No
		Landfills	**Yes**
		Mines	No
		Contaminated lands	No
		Other	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	**Yes**
		Physical Modifications	
		Channelisation	No
		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 below.

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

Marine finfish farms

TABLE 5 - Finfish farms

Fishing gear types	Direct	0-5 km	Comment
Salmonid fish farms	2	5	Salmon, Rainbow trout
Other finfish farms	0	0	NA

Table 5 provides a summary of the marine finfish farms located within 5 kilometres of the designated shellfish area. Map 14 illustrates these pressures. Marine finfish farms can be associated with increased nutrient levels from fish excretion and excess feed input.

There are 2 marine finfish farms within this designated shellfish area and a further 5 within 5 kilometres. Monitoring in the area does not indicate any water quality issues which are likely to arise from these finfish farms. Therefore, it is unlikely that these finfish farms are affecting shellfish water quality in this 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 6 - Fishing gears

Fishing gear types	Type	Present	Comment
Pots	Static	Yes	Widespread throughout the area
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 6 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 below 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.

Fishing gear activity in the area includes widespread line fishing (lines set on the seabed with bated hooks at intervals) and widespread use of pots (bated traps set on the seabed targeting crustaceans), both static fishing gears. This static fishing gear activity is unlikely to be affecting shellfish water quality in this shellfish area.

Structures and associated activities

TABLE 7 - Marine morphology structures

Marine morphology structures	Direct	0-5km	Comment
Ports	0	0	NA
Flow and sediment manipulation	1	3	Piers
Piled structures	0	2	Associated with piers
Causeways	0	0	NA

Table 7 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 plus 3 additional pier structures and 2 piled structures within 5 kilometres of the shellfish area. Monitoring in the area does not indicate any water quality issues which are likely to be associated with the structures themselves or their associated activities (such as boating and fishing), the WFD morphology status of the water body within which the activity takes place is ‘good’ (Map 12) and the WFD assessment of the risk posed to marine waters from marine morphology pressures deems the marine waters in and around this shellfish area to be ‘not at risk’ from morphological pressures (Map 13). Therefore, it is unlikely that the structures themselves or their associated activities are affecting shellfish water quality in this shellfish area.

Physical modifications

TABLE 8 - Physical modifications

Physical modifications	Direct	0-5 km	Comment
Shoreline reinforcement	0	5	Sea walls
Embankments	0	0	NA

Physical modifications	Direct	0-5 km	Comment
Reclaimed land	0	0	NA
Capital dredging	0	0	NA
Maintenance dredging	0	0	NA
Aggregate removal	0	0	NA
Dumping at sea	0	0	NA

Table 8 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 5 instances of shoreline reinforcement within 5 kilometres of the shellfish area. Monitoring in the area does not indicate any water quality issues which are likely to be associated with these modifications, the WFD morphology status of the water body within which the modifications are located is 'good' and the WFD assessment of the risk posed to marine waters from marine morphology pressures deems the marine waters in and around this shellfish area to be 'not at risk' from morphological pressures (Map 13). Therefore, it is unlikely that these modifications are affecting shellfish water quality in this shellfish area.

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 (OSWTS) 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 Wastewater Systems

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. The information in the table was compiled by the WFD Municipal and Industrial Regulation Study in 2008 and includes:

- the distance of the plants from the shellfish area
- the WFD status of the water body within which the plants are located
- the level of treatment available at the plants
- 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 were the distance between Q stations is less then 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 6 urban waste water treatment plants within the catchment, 1 of which has been designated as 'at risk' due to insufficient plant capacity and insufficient assimilative capacity in receiving waters. The WFD risk assessment was reviewed by experts in November 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.

The plant at Kenmare has a large design capacity (8,500 P.E.) and is situated approximately 5 kilometres from the eastern boundary of the shellfish area. This plant is currently operating at 14% above its design capacity and this is projected to rise to 20% by 2015. A scheme to upgrade Kenmare Sewerage Scheme is included in the current Water Services Investment Programme. At present waste water from the plant undergoes secondary treatment. A licence application was made by Kerry County Council in September 2008 (registration number D0184-01) pursuant to the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007.

A new plant was commissioned in 2008 at Sneem under the current Water Services Investment Programme. A licence application was made by Kerry County Council in March 2009 (registration number D0285-01) pursuant to the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007.

The plants at Ardgroom, Eyeries and Kilgarvan all have capacities of less than 500 P.E. Applications for certificates of authorisation will be made by Kerry and Cork County Councils by December 2009 pursuant to the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007.

Monitoring in the area does not highlight any water quality issues which are likely to be associated with these plants and therefore they are unlikely to be affecting shellfish water quality in this shellfish area.

TABLE 9 - Urban waste water treatment plants

Name	Map Ref	Dist	Status	Treatment level	WSIP 07-09	Capacity PE	% surplus existing	% surplus future	At Risk
Ardgroom	69	0-5	Moderate	Secondary	No	400	-	-	No
Eyeries Sewerage Scheme	141	0-5	Good	nd	No	180	56 %	56 %	No
Kenmare	323	0-5	Moderate	Secondary	Yes	8,500	-14 %	-20 %	Yes – A/B/C/D/E/F
Kilgarvan	324	10-20	Good	Primary	No	200	-100 %	-	Yes
Sneem	336	0-5	nd	Secondary	No	2,000	-	-	No

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

Table 10 lists the Combined Sewer Overflows (CSOs) in the catchment up to a distance of 20 kilometres from the designated shellfish area. 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
Kenmare	512	10-20	Moderate
Sneem	669	5-10	nd

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

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 2 known CSOs within the catchment. CSOs are a possible source of the faecal contamination indicated by shellfish monitoring and therefore they 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

Name	Map Ref	Distance	Status	Comment
Lauragh	42	0-5	Good	Finfish farms
Clonee	57	0-5	nd	Finfish farms
Glentrashna	61	5-10	Moderate	Finfish farms

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

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

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. Land-based finfish farms can be associated with elevated nutrient levels due to fish excretion and excess feed input.

There are 3 land-based finfish farms within the catchment. Monitoring in the shellfish area does not indicate any water quality issues which are likely to be associated with

these fish farms. Therefore, these finfish farms are unlikely to be affecting shellfish water quality in this shellfish area.

Abstractions

TABLE 12 - Abstractions

Name	Ma Ref	Type	Distance	Status	Abs Rate m^3 day^{-1}	At Risk (Ratio)
Dromerkeen Well	183	Groundwater	0-5	Good	0	No
Sneem 068A	1501	Groundwater	10-20	High	348	No
Gort	1824	Groundwater	10-20	Good	3	No
Urhan – copper mines springs	1847	Groundwater	10-20	Good	50	No
Lough Fadda	2163	Lake	5-10	Moderate	50	No
Bonane Stream	2177	River	10-20	Good	110	No
Bonane GS12	2178	River	10-20	Good	110	No
Behaghane River	2188	River	10-20	Moderate	302	Yes (> 40%)
Gowla River	2189	River	10-20	Moderate	302	Yes (> 40%)
Glenbeg Lough	2191	Lake	5-10	Moderate	1,000	No
Dromoghty Lake	2231	Lake	10-20	Good	391	No
Clogherane River	2238	River	0-5	Good	47	No
Dromtine Lough	2264	Lake	10-20	High	348	No
Rossacoosane Intake	2265	Lake	10-20	Moderate	115	No
Goulane Lough	2266	Lake	0-5	Good	82	Yes (> 10%)
Goulane Lough	2267	Lake	0-5	Good	81	Yes (> 10%)

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 16 abstractions in the catchment, 4 of which are 'at risk' due to the high ratio of the abstraction to the river flow/lake inflow. Two of them take place quite close to the shellfish area. These abstractions may be decreasing the available dilution capacity downstream but this is unlikely to affect shellfish water quality in this shellfish area.

Water Treatment Plants

TABLE 13 - Water treatment plants

Name	Map Ref	Distance	Status	Risk	Risk
Castletownbere New	206	5-10	Moderate	Yes	expert judgement

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 is 1 water treatment plants in the catchment and it has been designated as 'at risk' by expert judgement. This plant is an unlikely source of the faecal contamination

indicated in shellfish monitoring and therefore it is unlikely to be affecting shellfish water quality in this shellfish area.

Section 4 Licensed Industries

TABLE 14 - Section 4 Licenses

Name	Map Ref	Distance	Status	Risk
Cecilia Foley	308	0-5 km	Good	Yes - C/D/E/F
Sea Queen Ltd.	322	0-5 km	nd	No
Star Seafoods Ltd.	324	10-20 km	nd	No

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

Table 14 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

The WFD risk assessment in relation to Section 4 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 58.

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.

There are 3 Section 4 licensed industries in the catchment. One of them is 'at risk' due to insufficient assimilative capacity for BOD and nutrients in receiving waters and is located close to the shellfish area. However, it is an unlikely source of the faecal contamination indicated by shellfish monitoring and therefore it is unlikely to be affecting shellfish water quality in this shellfish area.

Quarries, mines, landfills and contaminated lands

TABLE 15 - Quarries, mines, landfills and contaminated lands

Name	Map Ref	Distance	Status	Risk	Notes
Sneem landfill	281	5-10	Good	No	Expert opinion

Table 15 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 is 1 landfill within the catchment and this has been deemed to be ‘not at risk’ by expert judgement. In addition, it is situated in a water body of ‘good’ WFD status so is unlikely to be affecting its surrounding water environment. It is an unlikely source of the faecal contaminated indicated by shellfish monitoring and therefore it is unlikely to be affecting shellfish water quality in this shellfish area.

5.2.2 Diffuse Source Pressures

On-site waste water treatment systems

TABLE 16 - On-site waste water treatment systems

Risk	Number	% of total
Total number	4,690 (258)	-
Number per km^2 in the catchment	5.41	-
Number per km^2 nationally	1.4	-
Number that are high risk to surface waters from pathogens	4,562	97.27%
Number that are high risk to groundwaters from pathogens	3,450	73.56%
Number that are high risk to surface waters from phosphorus	4,516	96.28%
Number that are high risk to groundwaters from phosphorus	3,447	73.49%
High likelihood of inadequate percolation of leachate	4,535	96.69%

Table 16 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 4,690 systems in the entire contributing catchment (Map 3) and their density is much higher than the national average. There are 258 systems within the catchments of the Croanshagh, Owenshagh, Glantrasna, Glanrastel, Glanmore, Drimminboy, Cummermasheen and Ahadav Rivers which discharge to the shellfish area and within the coastal region directly adjacent to the shellfish area. The risk to surface waters and groundwaters from pathogens and phosphorus is very high throughout the catchment as is the likelihood of inadequate percolation. The majority of the systems are therefore located in hydrologically unsuitable conditions. Many of them are located in the coastal region of the catchment in the direct vicinity of the shellfish area. Other factors which affect the likelihood of these systems to impact surface and groundwaters are whether suitable types of systems are selected, whether they are installed correctly, whether they are properly maintained and whether they are situated close to ditches, drains, watercourses, wells or boreholes. Therefore, it is likely that a substantially smaller number than the total number of systems in the catchment are posing a risk to surface and groundwaters. Shellfish monitoring indicates 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 17 - Livestock units and chemical fertiliser usage

Indicator	Catchment (per ha of farmed land)	National Average (per ha of farmed land)
Livestock units	0.38 LU	1.20 LU
Nitrogen fertiliser usage	59.16 kg	92.09 kg
Phosphorus fertiliser usage	4.11 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 17 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.

Over 40% of the area of this catchment is farmed land but the estimates of livestock density and fertiliser usage are lower than the national averages. The EPA's diffuse model risk assessment, which investigates the relationship between catchment attributes (percentages of diffuse land cover including agriculture), water chemistry and ecological status, does not highlight any risk areas from diffuse sources (Map 13). However, the prevalence of wet soils in the catchment (Map 5) could result in runoff from agricultural land and the steep slopes (Map 4) could increase the risk of runoff. Agriculture is a possible source of the faecal contamination indicated by shellfish monitoring and therefore agriculture could possibly be affecting shellfish water quality in this shellfish area.

Forestry

TABLE 18 - Forestry types

Type	Area	Percentage of area
Conifers	63.3 km^2	7.3 %
Broadleaves	16.7 km^2	1.9 %
Mixed	6.4 km^2	0.7 %
Other	0 km^2	0 %
Cleared	6.6 km^2	0.8 %
Unknown	13.03 km^2	1.5 %
Total	106.08 km^2	12.2 %
Nationally	6,795 km^2	10.0 %

Table 18 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 over 100 km^2 of forested land in this catchment and the percentage area under forest cover is higher than the national average. Unlike agriculture, the location of forestry activity is known and some forestry activity occurs in close proximity to the shellfish area including areas of coniferous forest. The EPA's diffuse model risk assessment, which investigates the relationship between catchment attributes (percentages of diffuse land cover including forestry), water chemistry and ecological status, does not highlight any risk areas from diffuse sources (Map 13) but the more recent risk assessment, undertaken by the WFD Forest and Water study, highlights areas of eutrophication and sedimentation risk (Maps 26 & 27). However, monitoring does not indicate any water quality issues which would be likely to be associated with forestry and, therefore, it is unlikely to be affecting shellfish water quality in this shellfish area.

5.2.3 Morphology Pressures

Structures

TABLE 19 - Natural and man-made barriers

Freshwater morphology structures	Number	Dist	Comment
Barriers to migration	2	5-10 km	1 natural, 1 artificial

Table 19 summarises the occurrences of morphological structures within the contributing catchment area up to a distance of 20 kilometres from the designated shellfish area. Map 28 illustrates this. Any impacts associated with barriers, which could include impacts on flow, sediment movement and fish migration, are likely to be localised.

There are 2 natural barriers to migration within the catchment but neither of them occur in the direct vicinity of the shellfish area. Therefore, they are unlikely to affect shellfish water quality in this shellfish area.

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 which are indicative of sewage related key pressures. Elevated chromium levels are also identified in the general area by WFD monitoring but the available shellfish samples are compliant with shellfish chromium standards.

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. On-site waste water treatment plants

There are 4,690 systems in the entire contributing catchment (Map 3) and their density is much higher than the national average. There are 258 systems within the catchments of the Croanshagh, Owenshagh, Glantrasna, Glanrastel, Glanmore, Drimminboy, Cummermashenn and Ahadav Rivers which discharge to the shellfish area and within the coastal region directly adjacent to the shellfish area. The risk to surface waters and groundwaters from pathogens and phosphorus is very high throughout the catchment as is the likelihood of inadequate percolation. The majority of the systems are therefore located in hydrologically unsuitable conditions. Many of them are located in the coastal region of the catchment in the direct vicinity of the shellfish area. Other factors which affect the likelihood of these systems to impact surface and groundwaters are whether suitable types of systems are selected, whether they are installed correctly, whether they are properly maintained and whether they are situated close to ditches, drains, watercourses, wells or boreholes. Therefore, it is likely that a substantially smaller number than the total number of systems in the catchment are posing a risk to surface and groundwaters. Shellfish monitoring indicates 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.

5.3.2 Potential Secondary Pressures

2. Agriculture

Over 40% of the area of this catchment is farmed land but the estimates of livestock density and fertiliser usage are lower than the national averages. The EPA's diffuse model risk assessment, which is based on percentages of diffuse land cover including agriculture, does not highlight any risk areas from diffuse sources (Map 13). However, the prevalence of wet soils in the catchment (Map 5) could result in runoff from agricultural land and the steep slopes (Map 4) could increase the risk of runoff. Agriculture is a possible source of the faecal contamination indicated by shellfish monitoring and therefore agriculture could possibly be impacting on shellfish water quality in this shellfish area.