
Submission in accordance with Article 5 of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, and in accordance with EC-DG Environment D.2 document “Reporting Sheets for 2005 Reporting” dated 19 November 2004.

For Ireland



Prepared by the Office of Environmental Assessment
Environmental Protection Agency



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March 2005

**Revised May 2005
Version 2**

TABLE OF CONTENTS

Reporting Sheet Code	Reporting Sheet Title
Analysis of the characteristics of the river basin district	
SWB 1	Typology of surface water bodies
SWB 2	Identification of surface water bodies
SWB 3	Provisional identification of artificial and heavily modified water bodies
SWB 4	Type-specific reference conditions, maximum ecological potential and reference network
GWB 1	Identification and initial characterisation of groundwater bodies
Review of the environmental impact of human activity	
SWPI 1	Summary of significant pressures on surface waters in the river basin district
SWPI 2	Identification of surface water bodies at risk
SWPI 3	Significant point source pollution on surface waters
SWPI 4	Significant diffuse source pollution on surface waters
SWPI 5	Significant water abstractions from surface water
SWPI 6	Significant water flow regulations and morphological alterations
SWPI 7	Assessment of the impact of the significant pressures on surface water bodies
SWPI 8	Uncertainties and data gaps
SWPI 9	Preliminary recommendations for surveillance monitoring
GWPI 1	Initial characterisation - Summary of pressures on groundwaters in the river basin district
GWPI 2	Identification of groundwater bodies at risk
GWPI 3	Significant Diffuse source pollution in groundwaters
GWPI 4	Significant Point source pollution to groundwaters
GWPI 5	Significant Groundwater abstraction
GWPI 6	Significant Artificial groundwater recharge
GWPI 7	Significant Saltwater intrusion
GWPI 8	Review of the impact of human activity on groundwater
GWPI 9	Further characterisation of groundwater bodies at risk
GWPI 10	Uncertainties and data gaps
GWPI 11	Recommendations for monitoring
Economic analysis of water uses	
ECON 1	Economic Analysis
Register of protected areas	
RPA 1	Register of Protected Areas

Reporting Sheet Code	SWB 1
Reporting Sheet Name	Typology of surface water bodies
Prepared by	GK
Reviewed by	JB, PC, MMcG
Status	
Date	18 March 2005
Version	3

Rivers

All Irish rivers have been allocated to one of 12 primary types, which have been shown to be ecologically meaningful in unimpacted river systems (See Table SWB 1.1). The typology follows the System B typology of the Water Framework Directive (WFD) and is based primarily on geology and its impact on water hardness and the slope or velocity of water in the channel. A dedicated WFD research project (RIVTYPE) studied a wide range of potential characteristics in order to assess their influence on the Annex V fauna and flora of Irish rivers (e.g. catchment size, altitude, latitude-longitude), but from a statistical point of view the most important controlling factors were geology/hardness and slope. Catchment size had a minor additional statistical significance but it did not help in the definition of the reference communities and would have greatly increased the total number of river types. The system B typology thus defined was also shown to provide a significant statistical improvement on the ecological discrimination provided by the System A typology. In addition to the basic 12 types of river water bodies a number of special river water body types have been treated separately due to their rarity and unusual ecological nature. Further details on Irish river typology are available at <http://www.wfdireland.ie/>.

Table SWB 1.1 Number of river water bodies occurring in each possible type for each river basin district

TYPE	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
11	34	82	54	10	34	54	9
12	59	146	272	37	139	140	8
13	25	36	142	9	49	100	4
14	37	16	182	20	52	63	0
21	6	15	26	17	43	43	2
22	16	38	56	25	71	55	11
23	1	11	15	10	24	24	2
24	0	8	10	3	24	13	0
31	125	190	57	506	288	58	23
32	52	104	63	202	168	69	12
33	1	6	6	35	32	29	0
34	0	3	2	9	27	17	0

River water bodies with catchments less than 10 km² were not delineated as discrete water bodies. These generally comprised the 1st order and some 2nd order streams in the upper reaches of catchments. However, these river stretches are part of the

catchment area of the next downstream river water body and in this way integrated into the Article 5 characterisation and risk assessment. Coastal streams with catchments less than 10 km² were also not delineated. During further characterization a subset of these small coastal river catchments will be examined for each River Basin District.

Lakes

A “System B” typology was found to be the most appropriate basis on which to define lake types in Ireland; twelve types have been identified using the factors Alkalinity (surrogate for Geology), depth and size (see Table SWB 1.2). Biological data from 60 high status lakes across several types and River Basin Districts were used to test that the selected hydromorphological types, derived from these factors, can be discriminated on a biological basis. A thirteenth type was identified to include a number of lakes at altitude >300m. Latitude and Longitude were not considered to be significant factors determining the flora and fauna of Irish lakes. An ERTDI research report describing in detail lake typology in Ireland will be available in 2005. A summary of the criteria used for Irish lake typology is available on <http://www.wfdireland.ie/>.

Table SWB 1.2 Number of lake water bodies greater than 0.5 km² occurring in each possible type for each river basin district

TYPE	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
1	0	0	0	0	0	0	0
2	1	0	2	1	10	7	0
3	1	0	0	0	0	0	0
4	1	0	10	2	16	11	0
5	0	0	0	0	1	0	0
6	3	0	0	7	6	14	0
7	0	0	0	0	1	0	0
8	2	0	3	1	7	7	1
9	0	0	0	0	0	0	0
10	0	0	0	18	7	1	0
11	0	0	0	0	0	0	0
12	1	0	0	15	7	0	0
TBC ¹	0	0	5	9	18	13	1

The typology and risk assessment of Irish lakes for article 5 included all lakes greater than 0.5 km² and lakes less than 0.5 km² if they were located in protected areas (e.g. in Special Areas of Conservation, or if they were used for water abstraction for drinking purposes).

Coastal and Transitional

The Typology for Transitional and Coastal Waters was developed on the basis of a research project “A proposed Typology for the UK and Republic of Ireland”, published by SNIFFER in April 2003 (Rogers *et al.*, 2003) <http://www.sniffer.org.uk/>. The scheme uses the System B (Alternative Classification) approach, because the

¹ Type To Be Confirmed once more data is available.

“System A” scheme was regarded as overly prescriptive and one which would lead to excessive and unnecessary subdivisions of water bodies considering the essential objective of the task, which is identifying water bodies as the basic management unit of the Water Framework Directive.

The Typology scheme uses the obligatory factors of Latitude and Longitude, tidal range and salinity (common to both Transitional and Coastal Waters) along with the optional factors, for Transitional Waters, mixing characteristics, mean substratum composition and extent of intertidal area and, for Coastal Waters, wave exposure. This scheme was considered to give the most ecologically relevant differentiation possible. This typology is therefore based on broad features of the physical environment of tidal waters, which, it is emphasised, are not mutually exclusive (for example, sheltered stretches will occur in coastlines which are predominantly exposed and *vice versa*). Because of this, it is recognised that the Type-Specific Reference Conditions for each of the Types must also be broadly based, and account for all of the diverse range of habitats, pelagic, epibenthic and sedimentary, intertidal and subtidal, which will occur in each; many of these habitats will occur across several or possibly all of the physical Types.

The Typology is described in detail in the UK Technical Advisory Group on the Water Framework Directive document “Guidance on Typology for Coastal and Transitional Waters of the UK and the Republic of Ireland” (UK Tag Paper 2a Final) and is available at http://www.wfduk.org/tag_guidance/Article_05/. The Typology consists of a total of 6 Transitional Water Types, of which 2 occur in the waters of the Republic of Ireland, and 12 Coastal Water Types, of which 5 occur in Republic of Ireland (See Tables SWB 1.3 and 1.4).

Due to a lack of the necessary range of descriptive data on which to base a system of criteria, no formal minimum size thresholds were established for the identification of transitional or coastal water bodies. The delineation of coastal and transitional water bodies is outlined in EU Reporting Sheet SWB 2.

Table SWB 1.3 Number of transitional water bodies occurring in each possible type for each river basin district

TYPE	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
TW1	0	0	0	0	0	0	0
TW2	10	16	29	14	21	14	6
TW3	0	0	0	0	0	0	0
TW4	0	0	0	0	0	0	0
TW5	0	0	0	0	0	0	0
TW6	3	5	14	6	47	8	3

Table SWB 1.4 Number of coastal water bodies occurring in each possible type for each river basin district.

TYPE	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
CW1	0	0	0	0	0	0	0
CW2	0	2	9	4	5	4	1
CW3	0	0	0	0	0	0	0
CW4	0	0	0	0	0	0	0
CW5	6	4	9	4	15	12	3
CW6	1	0	0	0	0	0	0
CW7	0	0	0	0	0	0	0
CW8	1	3	3	1	5	6	1
CW9	0	0	0	0	0	0	0
CW10	0	0	6	2	5	1	0
CW11	0	0	0	0	0	0	0
CW12	0	0	0	0	0	0	0

Co-ordination for international river basin districts

Ireland shares a number of cross-border river basins with Northern Ireland, and three IRBDs have been designated in relation to the island of Ireland, North and South (Neagh Bann, North Western and Shannon).

Arrangements for the implementation of the WFD in Northern Ireland and Ireland are coordinated on a bilateral basis at Ministerial level between the Minister with responsibility for the Environment (North) and the Minister for the Environment, Heritage and Local Government (South). The Ministers are assisted in their task of co-ordination by the North South Working Group on Water, which meets on a quarterly basis. In addition, the working group establishes from time to time such technical, advisory and other expert groups as it considers necessary to support its work within a general framework established by the Ministers. Irish and UK officials participate in meetings with both the UK and Irish technical groups.

An example of technical work carried out to date on a North South basis, is the delineation and typing of coastal and transitional water bodies. According to the WFD, all coastal waters associated with the island of Ireland are located within marine Ecoregion 1 (Atlantic Ocean). The scientific and technical aspects associated with the water body delineation and typing process has been completed on an Ecoregion basis as mentioned above.

Future water management will be implemented, and reported to Europe, at the River Basin District scale. A North South cross border water management consultancy project, **N**orth **S**outh **S**hared **A**quatic **R**esources (NS SHARE), which commenced on 1 August 2004 and will continue to March 2008, will facilitate co-ordinated implementation and delivery of technical tasks required by the Directive. The project is being funded by INTERREG IIIA and the relevant government departments in Northern Ireland and Ireland. The project is led by Donegal County Council (in Ireland) on behalf of the competent authorities in both national jurisdictions.

Reporting Sheet Code	SWB 2
Reporting Sheet Name	Identification of surface water bodies
Prepared by	GK
Reviewed by	JB, PC, MMcG
Status	
Date	18 March 2005
Version	3

Geographic Information

The following ESRI shape files are available:

River water bodies:

- Fields – unique code, name (if available), longitude/latitude, length (km) and type

Lake water bodies:

- Fields – unique code, name (if available), longitude/latitude, area (ha) and type

Transitional water bodies:

- Fields – unique code, name (if available), longitude/latitude, area (km²) and type

Coastal water bodies:

- Fields – unique code, name (if available), longitude/latitude, area (km²) and type

Rivers

In Ireland a digital river network which is based on 1:50,000 ordnance survey maps was used for river water body delineation. Many data are available for each stretch of river length including, stream name, Strahler stream order, area of upstream catchment, gradient, etc. Much of this additional attribute data is derived from a Digital Terrain Model prepared by the Environmental Protection Agency.

Change in stream order at river confluences was the primary criterion for river water body delineation. Streams with catchment areas less than 10 km² (mainly streams in the upper reaches of catchments or small coastal catchments) were not delineated as separate river water bodies.

Table SWB 2.1 Number of river water bodies, and land and marine areas for each RBD.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number	356	655	885	884	951	665	71
Land area (km ²)	6269	12834	11222	17963	12070	7385	1787
Land & marine area (km ²)	6657	13941	15077	19450	16952	9660	1977

Lakes

In Ireland a digital lake network which is based on 1:50,000 ordnance survey maps was used for lake water body delineation. All lakes greater than 0.5 km² were identified as lake water bodies. Lakes less than 0.5 km² were identified as lake water bodies if they were located in protected areas (e.g. in Special Areas of Conservation, or if they were used for water abstraction for drinking purposes), see Table SWB 2.2. Some lakes features were split either for typology reasons or due to pressures.

Table SWB 2.2 By size criteria, the total number of lakes (LWB), number of designated lakes (Des-LWB) and number of split lakes (Part-LWB) in each RBD.

RBD	Lake category	Size Criteria (km ²)				
		<0.5	0.5 - 1	1 - 10	10 - 100	>100
EA RBD	LWB	17	4	4	1	0
	Des-LWB	17	4	3	1	0
	Part-LWB	0	0	0	0	0
SE RBD	LWB	12	0	0	0	0
	Des-LWB	12	0	0	0	0
	Part-LWB	0	0	0	0	0
SW RBD	LWB	70	9	9	2	0
	Des-LWB	70	8	7	2	0
	Part-LWB	0	0	0	0	0
SH IRBD	LWB	60	21	25	5	2
	Des-LWB	59	8	8	4	2
	Part-LWB	2	2	3	0	1
WE RBD	LWB	249	38	27	7	1
	Des-LWB	244	30	22	7	1
	Part-LWB	1	0	1	3	1
NW IRBD	LWB	127	25	26	2	0
	Des-LWB	127	16	16	2	0
	Part-LWB	0	2	2	0	0
NB IRBD	LWB	0	1	1	0	0
	Des-LWB	0	0	0	0	0
	Part-LWB	0	0	0	0	0

Coastal and Transitional

Numbers of transitional and coastal water bodies are presented in Tables SWB 2.3 and SWB 2.4. Due to a lack of the necessary range of descriptive data on which to base a system of criteria, no formal minimum size thresholds were established for the identification of transitional or coastal water bodies. Instead, certain broad conventions were adopted.

The following categories of tidal waters were considered for designation as discrete Transitional or Coastal Water Bodies:

- Estuaries, bays and coastal water reaches identified for the purposes of reporting in respect of the Urban Waste water Treatment Directive and the Nitrates Directive were retained (with the appropriate subdivisions);

- Estuaries with catchment drainage areas greater than 80 km²;
- Estuaries, bays and coastal water reaches where known pressures were likely to be of significance;
- All transitional and coastal lagoons identified as such during the course of researches by and on behalf of the National Parks and Wildlife Service of the Department of Environment, Heritage and Local Government (with a general lower limit of 1 hectare);
- Coastal bays generally recognised and referred to as such: outer boundaries between a bay and the adjacent coastal water body were drawn according to the most prominent enclosing headlands or other significant physical features as considered appropriate.

In addition, coastal water reaches were identified based on a number of considerations, including boundaries between River Basin Districts and the distribution of major hydromorphological features such as major coastal promontories or bays.

Offshore water bodies, bounded internally by the baseline plus 1 nautical mile and externally by the outer boundary of territorial waters, were based primarily on the boundaries between River Basin Districts.

Table SWB 2.3 Total number of transitional water bodies (TWB), number of designated transitional waters (Des-LWB) and number of split transitional waters (Part-LWB) in each RBD.

	ERBD	SERBD	SWRBD	SH IRBD	WRBD	NW IRBD	NB IRBD
TWB	13	21	43	20	68	22	9
Des-TWB	10	17	27	18	61	20	8
Part-TWB	3	15	19	15	12	3	4

Table SWB 2.4 Total number of coastal water bodies (TWB) and coastline length in each RBD.

	ERBD	SERBD	SWRBD	SH IRBD	WRBD	NW IRBD	NB IRBD
Number of CWB	8	9	27	11	30	23	5
Entire length of coastline (incl. TWBs) in km	417	797	2757	1220	3237	1596	135
Length of coastline in CWBs only in km	221	350	1851	583	2615	1289	66

Geographical scale at which the data have been calculated

The water body metrics (river length, lake, coastal, transitional areas, etc.) have been calculated within the Irish National Grid projection system. The surface waterbody objects have been developed from mapped features presented in 1:50,000 Ordnance Survey of Ireland digital map data.

Reporting Sheet Code	SWB 3
Reporting Sheet Name	Provisional identification of artificial and heavily modified water bodies
Prepared by	GK
Reviewed by	JB, PC, MMcG
Status	
Date	18 March 2005
Version	2

Geographic Information

The following ESRI shapefiles files are available:

Provisional Artificial and Heavily Modified Water Bodies:

- Fields – unique water body code

Summary of the methodology for the preliminary identification of artificial and heavily modified water bodies

Some man-made and natural water bodies, which have been physically altered to a significant degree to facilitate human usage, may not be able to achieve all the elements that comprise good status. An example of such a situation might be where an impoundment on a river creates a regime and habitat, which is more akin to that of a lake than the natural river water body.

As a further part of the risk assessment process, surface water bodies, which cannot achieve good status as a result of hydrological or morphological alterations, have been provisionally identified. Hydrological and morphological pressures (known as hydromorphological pressures) include activities such as navigation, water abstraction and regulation, flood protection and land drainage. The designation process relates only to these hydromorphological pressures and not, for example, to severe pollution effects even if associated with the specified pressures.

The procedure for designation of a water body as an AWB or a HMWB is clearly set out in the WFD and further explained in a Common Implementation Strategy (CIS) Guidance Document which proposes a stepwise approach to the identification and designation of AWB and HMWB. This is an eleven-step process concluding with the design of a programme of measures to ensure GEP is achieved by 2015. The full designation of water bodies and development of measures are to be included in the draft River Basin Management Plan (RBMP) in 2008, however provisional identification (steps 1 to 6) were completed as part of the characterisation process.

The stepwise approach in the CIS document guided the development of the Irish methodology for the identification and designation of pAWB and pHMWB ('p' refers to provisional status) for the characterisation process, which is summarised in an Irish guidance document available on <http://www.wfdireland.ie/>.

The total numbers of pAWBs and pHMWBs are presented in Table SWB 3.1 for each river basin district.

Table SWB 3.1 Total numbers of provisionally identified artificial and heavily modified water bodies for each RBD.

	ERBD	SERBD	SWRBD	SH IRBD	WRBD	NW IRBD	NB IRBD
pHMWB	14	4	5	8	0	6	0
pAWB	5	7	1	21	2	0	1

Summary of future work planned to confirm (or otherwise) the designation of artificial and heavily modified water bodies

The schedule of provisionally identified AWBs and HMWBs will proceed to Steps 7 to 11 in 2005. Steps 7 and 8 include the further designation tests: these are the 'restoration' and 'alternative means' tests. As a result of these tests water bodies are either screened out and considered as natural water bodies with a target of GES or are finally designated (Step 9) as AWB/HMWB requiring the target of GEP to be set. Steps 10 and 11 entail the establishment of Maximum Ecological Potential MEP and GEP. The full designation of water bodies and development of measures are to be included in the draft River Basin Management Plan (RBMP) in 2008.

Reporting Sheet Code	SWB 4
Reporting Sheet Name	Type-specific reference conditions, maximum ecological potential and reference network
Prepared by	GK
Reviewed by	PC, JB, MMcG
Status	
Date	18 March 2005
Version	2

Note: This Reporting Sheet (22 October 2004, Version 2) states:

“The information requirements in this sheet will be further developed once it is known what additional information will be required to assess compliance with the Directive over and above what has been provided for the Intercalibration process.”

On this basis the information below is provided. Additional requirements for SWB 4 will be provided once made available.

Rivers

Descriptions of reference conditions for the major river types are included in a separate background document (“Reference Conditions for Irish Rivers – Description of River Types and Communities” available on <http://www.wfdireland.ie/>). For those river types for which reference conditions are no longer extant corresponding reference conditions will be derived by examination of archived samples or sought outside the State. In the event of neither of these options being available expert judgement will be used to define the reference conditions. In the majority of river types, however, it is likely that good reference condition sites will still be available.

The RIVTYPE project studied 50 high quality sites and these form the initial core group of stations for the reference network of rivers with high ecological status. These will be added to as additional data become available. The initial basis for reference conditions was Q5 in the EPA Quality Rating system based on primarily macroinvertebrates but which also takes into account of phytobenthos and macrophyte communities. Supporting physico-chemical and hydromorphological characteristics and catchment pressure also indicated that the selected sites are generally of very high status and thus, suitable reference condition sites. Supporting research to measure the concentrations of priority substances in sediments and biota is also being undertaken.

Lakes

Using available pressure, chemical and biological data, approximately 60 lake waterbodies were identified in 2002, across several types and River Basin Districts, as potential Reference condition sites. A project to establish the validity of this selection by examining the sediments of 40 of these lake waterbodies, using palaeolimnological techniques, was initiated. A sampling programme to collect further data on the biological elements phytoplankton, macrophytes and macroinvertebrates and physico-chemistry in the 60 lakes was carried out in 2002 and 2003. A report on this study will be available in 2005 on <http://www.wfdireland.ie/>. Where the reference condition status of a lake waterbody has been verified using palaeolimnology the biological and

supporting physico-chemical condition will be considered to be at Reference status. For types where no or too few reference sites are available within the State it is proposed to seek appropriate reference condition data outside the State and failing that to use singly or in combination, palaeolimnology and other historical data, indices and expert judgement to ensure the recommended number of reference sites are derived for each type.

Coastal and Transitional

The typology adopted for the Transitional and Coastal Waters of the UK and Republic of Ireland is of necessity a broad one, and in consequence, the Type-Specific Reference Conditions developed for these describe multiple habitat types, many of which are common across several types. The Reference Conditions statements were developed by the joint Ireland-UK Marine Task Team and its expert groups on each of the biological quality elements. They are based on a combination of information from provisional High Status waters, historical records and expert knowledge of the behaviour of ecological systems along with descriptive and predictive modeling tools.

The Reference Conditions descriptions are detailed in the UK Technical Advisory Group on the Water Framework Directive document “Type-Specific Reference Conditions Descriptions for Coastal and Transitional Waters for the UK”, available at http://www.wfduk.org/tag_guidance/Article_05/. These are considered to be broadly applicable to the tidal waters of the Republic of Ireland. Additional analysis of existing data and, it is expected, the collection of new field information will be required to contribute to the further development of these descriptions, as well as the derivation of appropriate Quantitative Reference Condition indicators, in 2005 and 2006.

A Reference Network of provisional High Status water bodies for the Transitional and Coastal Waters of the UK and Republic of Ireland (exclusive of lagoons at this stage) has been developed, though additions and alterations to the composition of the Network are currently being considered in the context of ongoing planning of field investigations leading up to the establishment of monitoring programmes under Article 8. It will be noted that, possibly with several small exceptions, all of the coastal waters of the Republic of Ireland are considered to be of High Ecological Status. A substantial number of transitional water bodies, discharging mainly to the south and west coasts, and the great majority of lagoons are also likely to be of High Ecological Status. All of these could be considered to comprise a Reference network; the consequence of such designation remains to be developed.

Maximum Ecological Potential

Maximum Ecological Potential (MEP) which is defined in Step 10 of CIS the Irish Guidance (<http://www.wfdireland.ie/>) for AWB and HMWB establishes the reference conditions for each designated water body or group of water bodies against which the environmental quality objective of Good Ecological Potential (GEP) is set (Step 11). For provisionally designated water bodies, the determination of GEP and the consequent risk of failing the GEP objective must be complete by December 2008.

The assessment will require expert judgement and will be undertaken by the Environmental Protection Agency supported by relevant authorities. If a designated AWB or HMWB will not be able to meet the objective of GEP by 2015, then a programme of measures or a case for derogation has to be developed for the draft first RBMP which allows one year for consultation on the draft RBMP before its publication in 2009.

Reporting Sheet Code	GWB 1
Reporting Sheet Name	Identification/delineation of groundwater bodies
Prepared by	GK
Reviewed by	DD, GW
Status	
Date	18 March 2005
Version	2

Geographic Information

The following ESRI shape files are available:

Groundwater bodies:

- Fields – unique code, name (if available), longitude/latitude and size (km²), type.

Groundwater body identification and delineation

Identification and delineation of groundwater bodies (GWBs) in Ireland was co-ordinated by the Irish Groundwater Working Group for WFD, chaired by the Geological Survey of Ireland, in conjunction with the River Basin District projects. The delineation of transboundary GWBs was co-ordinated with colleagues in the Geological Survey of Northern Ireland and through the INTERREG IIIA funded North-South SHARE project.

The CIS Guidance on ‘Identification of water bodies’ (2003) was used to develop an approach to delineating groundwater bodies in Ireland (“Approach to Delineation of Groundwater Bodies” available at <http://www.wfdireland.ie/>) and applied in the following way:

The aquifers were grouped into four groundwater body types, based on similarities in flow regime – karstic aquifers, gravel aquifers, productive fractured aquifers and poorly productive bedrock aquifers. The boundaries between adjacent groups usually represent either ‘no flow’ or ‘relatively low flow’ boundaries.

As groundwater catchment divides or highs generally coincide with surface water catchment boundaries, surface water boundaries were used to complete groundwater body delineation.

A total of 383 groundwater bodies were delineated using these principles. Where point pollution sources or the predicted impact on groundwater dependent ecosystems placed areas within these groundwater bodies ‘at risk’, new groundwater bodies were delineated using hydrogeological boundaries, giving a total of 757 groundwater bodies.

Table GWB 1.1 presents the number of GWBs, the number of transboundary GWBs and the number of GWBs with groundwater dependent surface water or terrestrial ecosystems.

Table GWB 1.1 Number of GWBs, transboundary GWBs and GWBs with groundwater dependent surface water or terrestrial ecosystems in each RBD.

CATEGORY	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
No. of GWB	75	151	84	242	105	72	28
No. of transboundary GWB	0	0	0	3	0	29	5
No. of GWB with dependent ecosystems	16	22	13	123	35	48	9

Reporting Sheet Code	SWPI 1
Reporting Sheet Name	Summary of the significant pressures on surface waters in the river basin district
Prepared by	GK
Reviewed by	JB, PC, MMcG, LS
Status	
Date	18 March 2005
Version	2

Table SWPI 1.1 Percentage of surface water bodies assessed for each RBD for diffuse, point, abstraction and morphological pressures resulting in either 1a – At significant risk or 1b – probably at significant risk.

River Basin District	Pressures resulting in either 1a or 1b risk category			
	Diffuse	Point	Abstraction	Morphological
EA RBD	78	23	8	63
SE RBD	76	20	4	36
SW RBD	25	11	6	25
SH IRBD	52	18	5	53
WE RBD	26	5	3	25
NW IRBD	28	9	11	26
NB IRBD	78	36	11	79

Table SWPI 1.1 above presents the percentage of surface water bodies assessed for diffuse, point, abstraction and morphological pressures resulting in either 1a – At significant risk or 1b – probably at significant risk for each RBD. The risk categories used in Ireland are described in Word file IE_swpi2_text.

Diffuse and morphological pressures were generally more important than point or abstraction pressures across RBDs. The Eastern RBD, South Eastern RBD, Shannon IRBD and Neagh Bann IRBD had the highest proportion of water bodies in the 1a or 1b risk categories. The South Western RBD, Western RBD and North Western IRBD had the lowest proportion of water bodies in 1a or 1b risk categories. In overall terms of importance, diffuse pressures ranked highest, followed by morphological pressures, point pressures and finally abstraction pressures.

The activities assessed in each of these pressures were:

- **Diffuse source pressures** including widespread activities such as agriculture, non-sewered population, urban land use, transport, some industrial activities and other main land uses which in Ireland would include peat exploitation and forestry activities.
- **Morphological alterations** including structures such as hydroelectric dams and major water supply reservoirs, and morphological pressures (or physical alterations) apply only to surface waters. Morphological pressures include activities such as channel alterations, agricultural enhancement, flood defenses, locks and weir facilities, dredging, ports and tidal barrages.

- **Point source pressures** including Urban Wastewater Treatment Plants (UWWT) plants, storm overflows, sludge treatment plants, Integrated Pollution Prevention and Control (IPPC) industries and non-IPPC industries.
- **Abstractions** including public and private water supply and industrial use

Further details on the risk assessment methodologies used to assess these pressures are available as background documents at <http://www.wfdireland.ie>.

Eutrophication has been identified as the single most important problem affecting the quality of surface waters in Ireland. Diffuse agricultural sources and municipal sewage are the main causes of eutrophication. The 2004 State of the Environment Report, "Ireland's Environment 2004" (available at www.epa.ie) indicates that 30% of Irish rivers are affected by this form of pollution. Seven per cent of the area of lake waters assessed was unsatisfactory in terms of trophic status. Ten estuaries and coastal waters have also been classified as eutrophic, and sections of a further three have been classified as potentially eutrophic. For rivers, most instances of slight or moderate pollution (mainly due to eutrophication) are attributed to agriculture and the bulk of the remainder to municipal sources. Municipal discharges, mostly sewage, are suspected to account for the bulk of known instances of serious pollution, which affects well under 1% of Irish rivers.

Reporting Sheet Code	SWPI 2
Reporting Sheet Name	Identification of surface water bodies at risk
Prepared by	GK
Reviewed by	PC, MMcG
Status	
Date	18 March 2005
Version	2

Geographic Information

The following ESRI shape files are available:

River water bodies:

IE_swpi_2_river_1a.dbf = river water bodies at significant risk

- Fields – unique code, risk assessment results for diffuse, point, abstraction, morphology, pollution (impact data/expert review) and an overall risk category

IE_swpi_2_river_1b2a.dbf = river water bodies where risk is uncertain

- Fields – unique code, overall risk category

IE_swpi_2_river_2b.dbf = river water bodies not at significant risk

- Fields – unique code, overall risk category

Lake water bodies:

IE_swpi_2_lake_1a.dbf = lake water bodies at significant risk

- Fields – unique code, risk assessment results for diffuse, point, abstraction, morphology, pollution (impact data/expert review) and overall risk category

IE_swpi_2_lake_1b2a.dbf = lake water bodies where risk is uncertain

- Fields – unique code, overall risk category

IE_swpi_2_lake_2b.dbf = lake water bodies not at significant risk

- Fields – unique code, overall risk category

Transitional water bodies:

IE_swpi_2_transitional_1a.dbf = transitional water bodies at significant risk

- Fields – unique code, risk assessment results for point, abstraction, morphology, pollution (impact data/expert review) and overall risk category

IE_swpi_2_transitional_1b2a.dbf = transitional water bodies where risk is uncertain

- Fields – unique code, overall risk category

IE_swpi_2_transitional_2b.dbf = transitional water bodies not at significant risk

Fields – unique code, overall risk category

Coastal water bodies:

IE_swpi_2_coastal_1a.dbf = coastal water bodies at significant risk

- Fields – unique code, risk assessment results for point, morphology, pollution (impact data/expert review) and overall risk category

IE_swpi_2_coastal_1b2a.dbf = coastal water bodies where risk is uncertain

- Fields – unique code, overall risk category

IE_swpi_2_coastal_2b.dbf = coastal water bodies not at significant risk

- Fields – unique code, overall risk category

Methodology to classify the risk category of water bodies

The WFD characterisation process requires an analysis of the pressures and impacts that human activities exert on Irish waters to be undertaken. The purpose of the analysis is to identify surface water bodies and groundwater bodies at risk of failing the objectives of the directive due to the effect of human activities.

The pressures and impacts analysis is also referred to as a risk analysis. The risk relates to the probability of a water body failing to achieve good status or suffering deterioration in water quality status.

Note: the risk assessment presented in this Characterisation Report relates to current pressures and does not attempt to predict the effect of any future changes in human activities. The implications of future changes in pressures and the management of these activities looking forward to 2015 will be considered as part of a further characterisation process and will be incorporated into the draft River Basin Management Plans in 2008.

The pressures and impacts analysis is particularly important because it establishes a baseline for the river basin management planning cycle. It does this by identifying priorities for establishing programmes of mitigating measures where the risk is confirmed and/or monitoring strategies where further investigation is required to confirm the potential risk. The development of monitoring and management responses will be the focus of WFD implementation activities across Europe from early 2005 until the publication of River Basin Management Plans in 2009.

Ireland has adopted the guiding principles for the risk analysis agreed by the EU Water Directors (Water Directors Meeting, Dublin June 2004) which are summarised as follows:

- The process and the results of the analysis should be transparent, comprehensible and all data and information should be made available to the public;
- Risk analysis is not classification of status i.e. it identifies the water bodies at the greatest risk of failing to achieve their objectives;
- The results will be used to help identify and prioritise the appropriate and iterative follow-up actions for the next stages of the planning process;
- Member States should ensure harmonised application of the key issues such as the baseline scenario and the identification of heavily modified water bodies;
- Lack of relevant data should not be an excuse - a “gap analysis” must be made if necessary.

The WFD originally required reporting of water bodies under two categories **at risk** or **not at risk**. In December 2004 the EU Commission’s Reporting Sheets (see Chapter 1) refined the reporting categories to at least one of three following categories, namely **at risk**, **risk uncertain** or **not at risk**. This recognised that further characterisation was necessary for some water bodies to determine risk with certainty. This was due to information gaps. For Ireland it was considered that use of four categories (**at significant risk**, **probably at significant risk**, **probably not at significant risk** and **not at significant risk**) improved the prioritisation of follow-up actions and recognised the uncertainties associated with the analysis and/or datasets.

The categories adopted to describe the water body's degree of risk are presented below in Table SWPI 2.1. These categories were developed by the UK WFD Technical Advisory Group (UK TAG) and are described at http://www.wfduk.org/tag_guidance/Article_05/. in the document "Guidance WP7a: General Principles for Risk Assessment". The adoption of the same system in Ireland assists with harmonising assessment and reporting between Ireland and its ecoregion neighbours and counterparts therefore facilitating the characterisation of Irish international RBDs.

Thresholds for Good Status

For rivers, the existing EPA river biotic index or Quality rating system (Q system) was used to develop thresholds to indicate good status. Thresholds for Good Status in rivers are described in the guidance notes on "Diffuse pollution model" and "Diffuse surface water risk assessment" available at <http://www.wfdireland.ie/>,

For lakes, thresholds for chlorophyll a and total phosphorus were developed to describe Good Status and are described in the guidance note on "Lake risk assessment" available at <http://www.wfdireland.ie/>,

For coastal and transitional waters the emphasis was on identifying significant pressures, due to lack of available status information in relation to the ecological quality elements outside the major bays and estuaries.

Table SWPI 2.1 Irish Risk Assessment Reporting Categories

WFD Risk Category	European Commission Reporting Sheet Risk Categories (Dec. 2004)	Irish Reporting Risk Categories
Water bodies at risk of failing to achieve an environmental objective	At Risk – Water bodies for which it is already clear without the need for further characterisation or additional monitoring data, that the objectives will be failed	<p>(1a) Water bodies at significant risk</p> <p>Action: Identifies water bodies for which consideration of appropriate measures to improve status can start as soon as practical</p>
	Risk Uncertain – Water bodies where, due to insufficient data , further characterisation and operational monitoring are necessary for a clear assessment of to be made	<p>(1b) Water bodies probably at significant risk but for which further information will be needed to confirm that this view is correct</p> <p>Action: Focus for more detailed risk assessments (including, where necessary, further characterisation) aimed at determining whether or not the water bodies in this category are at significant risk in time for the publication of the interim overview of significant water management issues in 2007</p>
Water bodies not at risk of failing to achieve an environmental objective		<p>(2a) Water bodies probably not at significant risk on the basis of available information for which confidence in the available information being comprehensive and reliable is lower</p> <p>Action: Focus for more detailed risk assessments aimed at determining whether or not the water bodies in this category are not at significant risk in time for the publication of the draft River Basin Management Plan due to be completed in 2008</p>
	Not at Risk – Water bodies for which it is already clear, without the need for further characterisation or additional monitoring data, that the achievement of the objectives are not at risk	<p>(2b) Water bodies not at significant risk on the basis of available information for which confidence in the available information being comprehensive and reliable is high</p> <p>Action: Identifies water bodies for which consideration of appropriate measures to ensure no deterioration in status can start as soon as practical</p>

Reporting Sheet Code	SWPI 3
Reporting Sheet Name	Significant point source pollution on surface waters
Prepared by	GK
Reviewed by	PC, MMcG, LS
Status	
Date	18 March 2005
Version	2

Table SWPI 3.1 Number of significant point sources in each RBD and number and percentage of all surface water bodies assessed for each RBD for point pressures resulting in 1a – At significant risk or 1b – probably at significant risk.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of significant point sources ²	155	22	8	63	21	17	11
Number of SWBs classed as 1a	37	17	7	44	12	16	12
Percentage of SWBs classed as 1a	9%	2%	1%	4%	1%	2%	14%
Number of SWBs classed as 1b	55	121	107	143	63	61	18
Percentage of SWBs classed as 1b	14%	18%	10%	14%	5%	7%	21%

Table SWPI 3.1 above presents the percentage of surface water bodies assessed for point source pressures resulting in either 1a – At significant risk or 1b – probably at significant risk for each RBD. Significant point sources are defined here as those point sources that result in a 1a risk category. The risk categories used in Ireland are described in Word file IE_swpi2_text.

In Table SWPI 3.1 the number of significant point sources are defined as those point sources that result in a 1a risk category. A water body that is at risk from point sources may be subject to several point sources. For example the Eastern RBD has over twice as many point sources as the Shannon IRBD but a similar number of SWBs in 1a risk category. The Neagh Bann IRBD has a higher percentage of 1a SWBs than the Eastern RBD but a substantially smaller number of point sources.

Point source pressures identified for surface waters include Urban Wastewater Treatment Plants (UWWT) plants, storm overflows, sludge treatment plants, Integrated Pollution Prevention and Control (IPPC) industries and non IPPC industries. Datasets for point source pressures were generally available on a national scale with Local Authorities providing data on non IPPC licensed industries.

The risk assessment methodologies used to examine these point sources including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

² Significant point sources are defined here as those point sources that resulted in a 1a risk category. A water body that is at risk from point sources may be subject to several point sources.

The point source risk assessments have pointed up a certain degree of deficiency in monitoring and reporting arrangements, which are currently in place. As well as rendering the risk assessments somewhat approximate, this has the consequence that detailed quantification of pollutant types and loads is not yet available in summary form for point sources. During further characterisation more detailed estimates of pollutant types and loads will be gathered for significant point sources in advance of the 2010 Reporting. Nitrogen, phosphorus, organic load and, more locally, certain priority substances are the important pollutant types from point sources.

In Ireland, as part of the Implementation of the WFD, a National Dangerous Substances Expert Group was established to assist with compiling a list of relevant dangerous substances for surface waters in Ireland and to design a substances screening monitoring programme. The Irish expert group produced a "Discussion Document - Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" (available at <http://www.wfdireland.ie>) provides information on the rationale behind the development of the list and the monitoring programme.

The current dangerous substances list is evolving and will be reviewed periodically to take account of developments such as changes in human practices and new scientific research findings which might identify additional substances that may warrant inclusion.

A National Dangerous Substances Screening Monitoring Programme is due to start in early 2005 to address this data gap. This is to include monitoring for the full lists of over 200 dangerous substances identified. This will test for the relevance of all candidate parameters and will provide data towards the further requirement to establish EQS levels for Irish waters.

Reporting Sheet Code	SWPI 4
Reporting Sheet Name	Significant diffuse source pollution on surface waters
Prepared by	GK
Reviewed by	PC, MMcG, LS
Status	
Date	18 March 2005
Version	2

Table SWPI 4.1 Number and Percentage of all surface water bodies assessed for each RBD for diffuse pressures resulting in 1a – At significant risk or 1b – probably at significant risk.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of SWBs classed as 1a	139	179	71	67	92	22	22
Percentage of SWBs classed as 1a	36%	26%	7%	7%	7%	3%	29%
Number of SWBs classed as 1b	165	334	180	450	225	214	37
Percentage of SWBs classed as 1b	43%	49%	18%	45%	18%	25%	49%

Table SWPI 4.1 above presents the percentage of surface water bodies assessed for diffuse pressures resulting in either 1a – at significant risk or 1b – probably at significant risk for each RBD. Significant diffuse sources are defined here as those diffuse sources that result in a 1a risk category. The risk categories used in Ireland are described in Word file IE_swpi2_text.

For the SWBs with a 1a risk category (at significant risk) highest percentages were reported in the Eastern RBD, the South Eastern RBD and the Neagh Bann IRBD. The South Eastern RBD, Shannon IRBD, Western RBD and North Western IRBD all had low percentages of 1a risk category surface water bodies at risk from diffuse pollution.

Diffuse source pressures assessed included widespread activities such as agriculture, non-sewered population, urban land use, transport, some industrial activities and other main land uses which in Ireland would include peat exploitation and forestry activities.

The risk assessment methodologies used to examine these diffuse sources including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

Detailed estimates of pollutant types and loads are not yet available in summary form for identified significant diffuse sources. During further characterisation more detailed estimates of pollutant types and loads will be gathered for significant diffuse sources in advance of the 2010 Reporting. Nitrogen, phosphorus, organic load and, more locally, certain priority substances are important pollutant types from diffuse sources.

As discussed in Reporting Sheet SWPI 3, an Irish expert group has produced a "Discussion Document - Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" (available at <http://www.wfdireland.ie>), which provides information on the rationale behind the development of a list of dangerous substances and a screening monitoring programme.

Reporting Sheet Code	SWPI 5
Reporting Sheet Name	Significant water abstractions from surface waters
Prepared by	GK
Reviewed by	PC, MMcG, LS
Status	
Date	14 March 2005
Version	1

Table SWPI 5.1 Number and percentage of all surface water bodies assessed for each RBD for abstraction pressures resulting in 1a – At significant risk or 1b – probably at significant risk. Number of abstraction points, total volume abstracted and water exploitation index for each RBD.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of SWBs classed as 1a	24	16	28	27	26	51	2
Percentage of SWBs classed as 1a	6%	2%	3%	3%	2%	6%	2%
Number of SWBs classed as 1b	8	9	28	21	9	45	7
Percentage of SWBs classed as 1b	2%	1%	3%	2%	1%	5%	9%
Number of abstraction points	32	52	79	110	120	96	9
Total volume abstracted (m ³ /day)	552610	139872	178180	140642	229190	195354	27969
Water Exploitation Index ³	0.497	0.051	0.046	0.047	0.093	0.192	0.226

Table SWPI 5.1 above presents the percentage of surface water bodies assessed for abstraction pressures resulting in either 1a – at significant risk or 1b – probably at significant risk for each RBD. Significant abstractions are defined here as those greater than 10m³/day or serving greater than 50 people. The risk categories used in Ireland are described in Word file IE_swpi2_text.

Few SWBs were at risk from abstraction. For the SWBs with a 1a risk category (at significant risk) highest percentages were reported in the Eastern RBD and the North Western IRBD.

A database of significant water abstractions including public and private water supply and industrial use have been provided by the Department of the Environment, Heritage and Local Government (DEHLG) and augmented by the RBD projects.

³ The "Water Exploitation Index" (WEI) is the ratio of the mean annual abstraction compared to the mean annual freshwater resource. The mean annual abstraction has been calculated for each RBD by considering all of the surface water abstractions that are greater than 10m³/day. The mean annual freshwater resource has been calculated by summing each of the low flow rates (95 percentiles) from each of the water catchments within each RBD. These low flow rates have been estimated from the low flow map used in the Hydrology Risk Assessment available at <http://www.wfdireland.ie>.

The risk assessment methodologies used to examine abstractions including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

Reporting Sheet Code	SWPI 6
Reporting Sheet Name	Significant water flow regulations and morphological alterations
Prepared by	GK
Reviewed by	PC, MMcG, LS
Status	
Date	18 March 2005
Version	2

Table SWPI 6.1 Number and percentage of all surface water bodies assessed for each RBD for flow regulation and morphological pressures resulting in 1a – At significant risk or 1b – probably at significant risk.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of SWBs classed as 1a	61	17	68	43	43	84	15
Percentage of SWBs classed as 1a	15%	2%	7%	4%	3%	9%	17%
Number of SWBs classed as 1b	194	232	187	497	304	145	53
Percentage of SWBs classed as 1b	48%	33%	18%	48%	22%	16%	62%

Table SWPI 6.1 above presents the percentage of surface water bodies assessed for flow regulation and morphological pressures resulting in either 1a – at significant risk or 1b – probably at significant risk for each RBD. The risk categories used in Ireland are described in Word file IE_swpi2_text.

For the SWBs with a 1a risk category (at significant risk) highest percentages were reported in the Eastern RBD and the Neagh Bann IRBD. Whilst the 1a category numbers and percentages are low, the statistics for 1b SWBs are quite high indicated the low confidence associated with many of the risk tests. Further refinement of the morphological risk assessments will be required during further characterization .

Flow regulation pressures, which include structures such as hydroelectric dams and major water supply reservoirs, and morphological pressures (or physical alterations) apply only to surface waters. Morphological pressures include activities such as channel alterations, agricultural enhancement, flood defences, locks and weir facilities, dredging, ports and tidal barrages. A database of these pressures was generated by the RBD projects based on collation of datasets from disparate organisations.

An estimate of the number of significant morphological alterations in each RBD was not possible since many of the pressures assessed were not discrete features and therefore difficult to count, e.g. the activity of arterial drainage, agricultural enhancement.

The risk assessment methodologies used to examine these flow regulation and morphological pressures including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

Reporting Sheet Code	SWPI 7
Reporting Sheet Name	Assessment of the impacts on surface water bodies
Prepared by	GK
Reviewed by	PC, MMcG
Status	
Date	18 March 2005
Version	2

Note: This Reporting Sheet (17 November 2004, Version 7) states:

“Some Member States appear not to have formally collected data on the environmental impacts caused by significant pressures having interpreted the Directive’s definition of Assessment of Impacts as identification of water bodies at risk. They are therefore unwilling to accept SWPI7 in its current form.

However, the collection of information on the environmental impacts is important at this stage to enable the Commission to judge the effectiveness of future programmes of measures at a later date.

*The Commission therefore requests that Member States supply the information at a River Basin District Level on a voluntary basis from **2005**. However, detailed information at a water body level should be supplied by **2010**.”*

On this basis reporting on this sheet is deferred until 2010 when detailed information at a water body level will be provided as required.

Reporting Sheet Code	SWPI 8
Reporting Sheet Name	Uncertainties and data gaps
Prepared by	GK
Reviewed by	PC, MMcG
Status	
Date	18 March 2005
Version	2

The two risk categories where confidence is lower (1b - **probably at risk** or 2a - **probably not at risk**) represent a significant proportion of surface water bodies nationally, e.g. 55% for river water bodies. This highlights the significant uncertainties and data gaps which currently exist in determining risk with a high degree of certainty for all water bodies. The immediate next task facing Irish authorities is to address these uncertainties and data gaps to increase the confidence in the risk assessment in time for the first draft River Basin Management Plans in 2008.

The water bodies in category **1b - probably at risk** will receive higher priority which will entail the intensive and focused collection of key datasets to confirm the risk by 2008. This will also inform the development of measures if the water body is confirmed to be at risk.

The water bodies in category **2a - probably not at risk** are of lower priority and will be investigated further involving less intensive, although targeted data collection to confirm the absence of risk.

Generally these uncertainties and data gaps will be addressed by:

1. Delivery of water status classification schemes in 2006 to assess impact
2. Implementation of monitoring programmes by 2006 applying the new water status classification scheme.
3. Collection of additional key **driving force, pressures, state, impact** datasets necessary to complete the risk assessment with a high level of confidence.
4. Improvements in risk assessments using modelling techniques to maximise use of all available data.
5. Formulation of **responses** (Measures) taking into account economic aspects, thus providing the most cost effective options for achieving good status in each water body.

The following tables (Table SWPI 8.1, 8.2 and 8.3) provide details on uncertainties and data gaps and the proposed next steps under the headings of **1. Review of Impacts of human activities**, **2. AWBs and HMWBs** and **3. Economic Analysis of Water Use**.

Table SWPI 8.1 Review of Impacts of human activities (Uncertainties, data gaps and next steps)

Topic/Issue	Uncertainty / Data Gap	Next Step
Driving forces	Driving Forces need to be quantified at water body level (e.g. population growth, future changes resulting from reform of the Common Agricultural Policy, future changes as a result of implementation of the forthcoming Nitrates Action Programme).	See Economic strategy in Table SWPI 8.3 (below)
Pressure/Activity <i>Water abstraction and flow regulation</i>	A number of unregulated activities abstract water – the impact of these activities is unknown but may be significant in certain cases	Improved monitoring and/or management of these activities will be considered
	The low flow water resource has been estimated based on a screening tool	Better hydrological data or models are required to increase the confidence in this assessment
<i>Morphological alterations</i>	Datasets in relation to morphological pressures are held in disparate organisations, some are incomplete or out of date and others had to be generated from base mapping or aerial photographs	The knowledge of morphological pressures needs to be improved. Protocols for assessment of morphological metrics have been developed including aerial photography, GIS-based metrics and field-based measurements. A monitoring programme will be based on these techniques.
	The impacts of activities involving morphological changes including river drainage works is unknown	A national hydromorphology assessment committee and ERTDI Hydromorph Project, NSSHARE Project are planned
Point source pollution	The point source risk assessments were dependent on available monitoring data, in certain cases (for example Section 4 industries) compliance datasets were not readily available	Facilities monitoring programmes will have to be improved to increase the confidence in this assessment. Improved electronic data transfer is required for results of both self-monitoring and compliance monitoring programmes.
	Some key datasets are not available for example farmyard storage facility assessments	These data would inform future assessments of agricultural risk.
	Thresholds were applied dictated by available datasets - this means that some significant pressures might not be included	Further characterisation will refine the level of detail included in the assessments
	More quantitative assessment of significant pressures will be required to consider the broader objectives of the WFD	Existing licenses may have to be reviewed and modelling for licence consents may have to be introduced

Table SWPI 8.1 (continued) Review of Impacts of human activities (Uncertainties, data gaps and next steps)

Topic/Issue	Uncertainty / Data Gap	Next Step
<i>Diffuse source pollution</i>	The resolution of data available to some of the diffuse assessments was limited (for example agricultural data is based on information at District Electoral Division level and therefore does not accurately represent farm level variations)	Higher resolution datasets will need to be generated to increase confidence in risk assessments. A major ERTDI research project on nutrient loss from agriculture is due to report in mid 2005, which will deliver a range of new tools for the prediction of phosphorus loss from soils. A project aimed at assessing the importance of pollution delivery via first order streams has also been initiated.
	More quantitative assessment of significant pressures will be required	Greater application of suitable mathematical models is required. A farm risk assessment procedure is also being developed.
	The impact of 'septic tanks' in one-off houses needs to be quantified in relation to soil type, distance from and pathways to nearest surface water or groundwater body.	Improved mapping, monitoring and modelling of individual septic tank discharges is required. An assessment and risk rating system is required for the existing stock in order to support future measures.
	In many cases chronic diffuse pollution occurs as indicated by downstream ecological assessments but pinpointing precise sources of pollution 'hot spots' within catchments may be quite difficult. This will lead to imprecision in the design of remedial measures.	Improved temporal monitoring using electronic sensors and telemetry placed on a large number of points along a river network, for example, should be trialled as a means of pinpointing pollution events both spatially and temporally.
	Improved understanding of nutrient and silt losses from forestry planted on deep peat soil (mineral poor soils). Similarly improved assessment of coniferous forestry plantations in low and mid-alkalinity, acid sensitive catchments.	Detailed assessment of existing monitoring datasets on P and N loss from coniferous plantations – at planting stage, re-fertilisation and clear-felling with or without re-fertilisation. Detailed additional monitoring in a limited number of representative catchments where gaps in understanding still exist.
	Improved understanding and quantification of diffuse urban and road runoff.	Research and monitoring of urban and road runoff in the Irish situation.

Table SWPI 8.1 (continued) Review of Impacts of human activities (Uncertainties, data gaps and next steps)

Topic/Issue	Uncertainty / Data Gap	Next Step
State General pollutants	Pollutant monitoring data is not currently available for all water bodies categorised as (1a) at risk or (1b) probably at risk	Monitoring will need to be extended to cover all water bodies identified as (1b) probably at risk
Dangerous substances	The issue of dangerous substances is a significant, data gap/area of uncertainty in Ireland. Currently there is an inability to quantify the range of substances and annual load of pollutants. Consequently, there is lower confidence in the risk assessments related to dangerous substances.	The lack of data in relation to dangerous substances will be addressed by additional data collection and monitoring for the first river basin management plan. A National Substances Screening Monitoring Programme was started in 2005. This is to include monitoring over 200 dangerous substances identified.
Impact	More data for all water categories will be required (in particular a gap was evident within coastal waters)	Future monitoring programmes will have to cover all elements included under the WFD and to focus on at risk water bodies
Risk Assessment Procedures	The initial characterisation has identified key pressures based on screening or semi-quantitative assessments –	Surface waters will require more detailed assessment including investigative monitoring and mathematical modelling studies during the further characterisation process.
Other Assessments Alien species	The risk assessment was developed from expert knowledge	Improved recording of such pressures will be required.
Fishing activities	The risk assessment was developed from expert knowledge	While detailed assessment of fishing pressure is available for some species such as Atlantic salmon, in general improved recording of fishing pressures will be required.
Protected area compliance	Availability of national datasets is currently limited	This issue needs to be addressed to provided necessary information for WFD implementation

Table SWPI 8.2 AWBs & HMWBs (Uncertainties, data gaps and next steps)

Topic/Issue	Uncertainty / Data Gap	Next Step
Identification of AWBs & HMWBs	The economic cost of alternative restoration measures are currently unknown. Equally the economic benefits of such restoration against the economic benefits of maintaining the AWBs and HMWBs are also unknown.	The schedule of provisionally identified HMWBs and AWBs will proceed to Steps 7 - 11 in early 2005. Steps 7 and 8 include the further designation tests: these are the 'restoration' and 'alternative means' tests. As a result of these tests water bodies are either screened out and considered as natural water bodies with a target of GES or are finally designated (Step 9) as AWB/HMWB requiring the target of GEP to be set. Steps 10 and 11 entail the establishment of Maximum Ecological Potential MEP and GEP.
Establishment of GEP for AWBs & HMWBs	For provisionally designated water bodies, the determination of GEP and the consequent risk of failing the GEP objective are currently unknown but must be complete by December 2008.	The assessment will require expert judgement and will be undertaken by the EPA supported by relevant authorities. If a designated HMWB or AWB will not be able to meet the objective of GEP by 2015, then a programme of measures or a case for derogation has to be developed for the draft first RBMP which allows one year for consultation on the draft RBMP before its publication in 2009.

Table SWPI 8.3 Economic analysis of water Use (Uncertainties, data gaps and next steps)

Topic/Issue	Uncertainty / Data Gap	Next Step
<p>Future Economic Analysis</p> <p><i>Cost-effectiveness Analysis.</i></p> <p><i>Cost-benefit Analysis.</i></p> <p><i>Cost-incidence Analysis.</i></p>	<p>A body of information potentially relevant to future economic analysis currently does not exist. Supplementary information will be needed to support the three general types of economic analysis below:</p> <p>Only a ranking of impacting sources exists for each RBD;</p> <p>The benefits estimations needed to conduct the cost-benefit analysis are only partially complete at the RBD level and absent at the water body or river segment level.</p> <p>In Ireland, the information necessary to comprehensively assess the distribution of costs of water services in relevant hydrologic or political areas is not currently available.</p>	<p>Marginal remediation costs across sub-sectors or geographical groupings of water users need to be developed.</p> <p>These information ‘gaps’ are not necessarily information ‘needs’, which will only become apparent as the WFD planning process moves into the next phase.</p> <p><u>Economic analysis - Proposed strategy to simultaneously supplement the baseline and generate the priority information needed in the short-term for developing the programme of measure</u></p> <ul style="list-style-type: none"> • Coordinate with other Member States to monitor methodologies and approaches • Research potential management measures and implementation methods consistent with the polluter-pays and user-pays principles and with reference to their general types and spatial qualities • Develop selection methodologies and criteria to support evaluation and comparison of alternative measures and programmes taking account of direct and indirect economic impacts, monetisation of environmental outputs, cost-effectiveness analysis of alternative programmes of measures and cost incidence of charging schemes • Pilot test the methodologies on selected water bodies or groups of water bodies to evaluate the methods and determine additional data requirements • Refine methodologies (if necessary) and develop a unified implementation strategy.

Reporting Sheet Code	SWPI 9
Reporting Sheet Name	Preliminary recommendations for Surveillance Monitoring
Prepared by	GK
Reviewed by	MMcG, PC
Status	
Date	18 March 2005
Version	2

The first step in the development of monitoring programmes is a review of existing networks and systems. The EPA is reviewing the surface water surveillance site proposals in conjunction with the RBD authorities. Consideration is being given to inclusion of the European Information Exchange, OSPAR RID and selected EIONET Eurowaternet sites as part of the Surveillance Monitoring programme. Eurowaternet is the European Environment Agency's Monitoring and Information Network for Inland Water Resources which was established in the late 1990s with the aim to monitor water quality trends across Member States. The 'representative' Eurowaternet sites in particular may be suitable for determining long-term trends – which is one of the primary goals of Surveillance Monitoring laid down in the WFD. The EPA is reviewing the selection of these Eurowaternet sites with regard to the WFD requirements.

For coastal and transitional waters EPA, in conjunction with all of the main regulatory and development bodies involved in monitoring at national and local level, has completed a detailed review of all extant monitoring activities being carried out (see www.epa.ie for further details). This review identified a number of significant gaps in monitoring arrangements, particularly in relation to ecological monitoring and monitoring of priority substances.

The monitoring programmes and Surveillance Monitoring in particular will be developed in conjunction with ongoing further characterisation and refinement of the risk assessments. As mentioned in SWPI 8, a large proportion of Ireland's water bodies are classified in the risk categories where confidence is lower (1b – probably at risk or 2a – probably not at risk). It is envisaged that many of the uncertainties in the initial risk assessment category of these water bodies will be clarified by mid-2006 or early 2007 in advance of the finalisation and reporting of definitive monitoring programmes on 22 March 2007.

Surveillance Monitoring requires monitoring the full suite of biological elements specified in Annex V of the WFD. A wide range of Irish research projects are under way to develop suitable classification techniques for all the biological elements for surface waters. It is envisaged that suitable techniques will be available for Surveillance Monitoring classification by the start of the WFD monitoring programmes in 2006.

A full suite of Annex X dangerous substances analyses is required on a monthly basis for at least one year for each site selected as a Surveillance Monitoring Programme site. It may also be necessary to include a wider range of priority hazardous substances that are in use in the catchment. While a number of previous screening exercises for priority substances have shown very low levels of contamination in Irish

waters, there is perceived to be a lack of sufficient data in relation to dangerous substances.. Consequently, there is at present a lower confidence in the risk assessments related to dangerous substances. The long-term ecological monitoring programme in place for rivers since the early 1970s in Ireland, does, however, demonstrate that severe or chronic problems due to priority substances are relatively rare in Irish rivers. The lack of data in relation to dangerous substances will be addressed by additional data collection and monitoring for the first river basin management plan.

In Ireland, as part of the Implementation of the WFD, a National Dangerous Substances Expert Group was established to assist with compiling a list of relevant dangerous substances for surface waters in Ireland and to design a substances screening monitoring programme. The approach used for the identification of the list of substances and monitoring programme was in accordance with guidance issued by the CIS IMPRESS working group. The Irish expert group produced a "Discussion Document - Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" (available at <http://www.wfdireland.ie>) provides information on the rationale behind the development of the list and the monitoring programme.

The current dangerous substances list are evolving and will be reviewed periodically to take account of developments such as changes in human practices and new scientific research findings which might identify additional substances that may warrant inclusion.

A National Substances Screening Monitoring Programme started in March 2005 to address this data gap. This is to include monitoring for the full lists of over 200 dangerous substances identified. This programme will measure the concentrations of over 200 dangerous substances in water, sediment and biota at a carefully selected set of sites designed to pick up impacts from known or potential sources of dangerous substances. The inclusion of sediment and biota measurements will inform future monitoring programmes in particular as measurement of many dangerous substances directly in water itself is unreliable especially for those that are not water soluble. The programme will test for the relevance of all candidate parameters and will provide data towards the further requirement to establish EQS levels for Irish waters.

Reporting Sheet Code	GWPI 1
Reporting Sheet Name	Summary of the significant pressures on groundwaters in the river basin district
Prepared by	GK
Reviewed by	GSI
Status	
Date	4 May 2005
Version	3

Table GWPI 1.1 Percentage of groundwater bodies assessed for each RBD for diffuse, point, abstraction and intrusion pressures resulting in either 1a – At significant risk or 1b – probably at significant risk.

River Basin District	Pressures resulting in either 1a or 1b risk category			
	Diffuse	Point	Abstraction	Intrusion
EA RBD	56	45	7	0
SE RBD	57	33	5	1
SW RBD	62	49	1	1
SH IRBD	22	51	10	0
WE RBD	25	15	7	7
NW IRBD	14	22	0	0
NB IRBD	43	50	7	0

Table GWPI 1.1 above presents the percentage of groundwater bodies assessed for diffuse, point, abstraction and intrusion pressures resulting in either 1a – At significant risk or 1b – probably at significant risk for each RBD. The risk categories used in Ireland are described in Word file IE_ gwpi2_text.

Point and diffuse pressures were more important than abstraction or intrusion pressures across RBDs. The Eastern RBD, South Eastern RBD, South Western RBD Shannon IRBD and Neagh Bann IRBD had the highest proportion of water bodies in the 1a or 1b risk categories. The, Western RBD and North Western IRBD had the lowest proportion of water bodies in 1a or 1b risk categories. In terms of groundwater body numbers “at risk”, point pressures ranked highest, followed by diffuse pressures, abstraction pressures and finally intrusion pressures. However, in terms of GWB area, diffuse sources have greatest importance.

The activities assessed in each of these pressures were:

- **Point source pressures** including in relation to groundwaters migration of pollutants from contaminated land, waste disposal sites and oil industry infrastructure and discharges to groundwaters from mines and soakaways.
- **Diffuse source pressures** including widespread activities such as agriculture, non-sewered population, urban land use, transport, some industrial activities and other main land uses which in Ireland would include forestry activities.
- **Abstractions** including public and private water supply and industrial use.
- **Intrusions** saltwater intrusions.

The 2004 EPA State of the Environment Report (available at www.epa.ie) indicates that deficiencies in livestock waste management and the poor siting of on-site waste water treatment systems, such as septic tanks, have led to some groundwaters having an unacceptable level of contamination.

Reporting Sheet Code	GWPI 2
Reporting Sheet Name	Identification of groundwater bodies at risks
Prepared by	GK
Reviewed by	GSI
Status	
Date	18 March 2005
Version	2

Geographic Information

The following ESRI shape files are available:

Groundwater bodies:

IE_gwpi_2_groundwater_1a.dbf = groundwater bodies at significant risk

- Fields – unique code, risk assessment results for diffuse, point, abstraction, intrusion and an overall risk category

IE_gwpi_2_groundwater_1b2a.dbf = groundwater bodies where risk is uncertain

- Fields – unique code, overall risk category

IE_gwpi_2_groundwater_2b.dbf = groundwater bodies not at significant risk

- Fields – unique code, overall risk category

Methodology to classify the risk category of water bodies

The WFD characterisation process requires an analysis of the pressures and impacts that human activities exert on Irish waters to be undertaken. The purpose of the analysis is to identify surface water bodies and groundwater bodies at risk of failing the objectives of the directive due to the effect of human activities.

The pressures and impacts analysis is also referred to as a risk analysis. The risk relates to the probability of a water body failing to achieve good status or suffering deterioration in water quality status.

Note: the risk assessment presented in this Characterisation Report relates to current pressures and does not attempt to predict the effect of any future changes in human activities. The implications of future changes in pressures and the management of these activities looking forward to 2015 will be considered as part of a further characterisation process and will be incorporated into the draft River Basin Management Plans in 2008.

The pressures and impacts analysis is particularly important because it establishes a baseline for the river basin management planning cycle. It does this by identifying priorities for establishing programmes of mitigating measures where the risk is confirmed and/or monitoring strategies where further investigation is required to confirm the potential risk. The development of monitoring and management responses will be the focus of WFD implementation activities across Europe from early 2005 until the publication of River Basin Management Plans in 2009.

Ireland has adopted the guiding principles for the risk analysis agreed by the EU Water Directors (Water Directors Meeting, Dublin June 2004) which are summarised as follows:

- The process and the results of the analysis should be transparent, comprehensible and all data and information should be made available to the public;
- Risk analysis is not classification of status i.e. it identifies the water bodies at the greatest risk of failing to achieve their objectives;
- The results will be used to help identify and prioritise the appropriate and iterative follow-up actions for the next stages of the planning process;
- Member States should ensure harmonised application of the key issues such as the baseline scenario and the identification of heavily modified water bodies;
- Lack of relevant data should not be an excuse - a “gap analysis” must be made if necessary.

The WFD originally required reporting of water bodies under two categories **at risk** or **not at risk**. In December 2004 the EU Commission’s Reporting Sheets (see Chapter 1) refined the reporting categories to at least one of three following categories, namely **at risk**, **risk uncertain** or **not at risk**. This recognised that further characterisation was necessary for some water bodies to determine risk with certainty. This was due to information gaps. For Ireland it was considered that use of four categories (**at significant risk**, **probably at significant risk**, **probably not at significant risk** and **not at significant risk**) improved the prioritisation of follow-up actions and recognised the uncertainties associated with the analysis and/or datasets.

The categories adopted to describe the water body’s degree of risk are presented below in Table GWPI 2.1. These categories were developed by the UK WFD Technical Advisory Group (UK TAG) and are described at http://www.wfduk.org/tag_guidance/Article_05/. in the document “Guidance WP7a: General Principles for Risk Assessment”. The adoption of the same system in Ireland assists with harmonising assessment and reporting between Ireland and its ecoregion neighbours and counterparts therefore facilitating the characterisation of Irish international RBDs.

Thresholds for Good Status

Due to a lack of groundwater quality data in many areas of Ireland, the emphasis was on identifying significant pressures and undertaking a predictive risk assessment rather than assessing status. Thresholds were developed in some instances, e.g. for nitrate and phosphorus, and these are described in the background risk assessment documents for groundwater, available at <http://www.wfdireland.ie/>.

Table GWPI 2.1 Irish Risk Assessment Reporting Categories

WFD Risk Category	European Commission Reporting Sheet Risk Categories (Dec. 2004)	Irish Reporting Risk Categories
Water bodies at risk of failing to achieve an environmental objective	<p>At Risk – Water bodies for which it is already clear without the need for further characterisation or additional monitoring data, that the objectives will be failed</p>	<p>(1a) Water bodies at significant risk</p> <p>Action: Identifies water bodies for which consideration of appropriate measures to improve status can start as soon as practical</p>
	<p>Risk Uncertain – Water bodies where, due to insufficient data, further characterisation and operational monitoring are necessary for a clear assessment of to be made</p>	<p>(1b) Water bodies probably at significant risk but for which further information will be needed to confirm that this view is correct</p> <p>Action: Focus for more detailed risk assessments (including, where necessary, further characterisation) aimed at determining whether or not the water bodies in this category are at significant risk in time for the publication of the interim overview of significant water management issues in 2007</p>
Water bodies not at risk of failing to achieve an environmental objective		<p>(2a) Water bodies probably not at significant risk on the basis of available information for which confidence in the available information being comprehensive and reliable is lower</p> <p>Action: Focus for more detailed risk assessments aimed at determining whether or not the water bodies in this category are not at significant risk in time for the publication of the draft River Basin Management Plan due to be completed in 2008</p>
	<p>Not at Risk – Water bodies for which it is already clear, without the need for further characterisation or additional monitoring data, that the achievement of the objectives are not at risk</p>	<p>(2b) Water bodies not at significant risk on the basis of available information for which confidence in the available information being comprehensive and reliable is high</p> <p>Action: Identifies water bodies for which consideration of appropriate measures to ensure no deterioration in status can start as soon as practical</p>

Reporting Sheet Code	GWPI 3
Reporting Sheet Name	Significant diffuse pollution to groundwater
Prepared by	GK
Reviewed by	GSI
Status	
Date	4 May 2005
Version	3

Table GWPI 3.1 Number and Percentage of groundwater bodies assessed for each RBD for diffuse pressures resulting in 1a – At significant risk or 1b – probably at significant risk.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of GWBs classed as 1a	0	0	0	0	0	0	0
Percentage of GWBs classed as 1a	0%	0%	0%	0%	0%	0%	0%
Number of GWBs classed as 1b	42	86	52	53	26	10	12
Percentage of GWBs classed as 1b	56%	57%	62%	22%	25%	14%	43%

Table GWPI 3.1 above presents the percentage of groundwater bodies assessed for diffuse pressures resulting in either 1a – at significant risk or 1b – probably at significant risk for each RBD. The risk categories used in Ireland are described in Word file IE_gwpi2_text.

There were no GWBs in the 1a risk category from diffuse pollution indicating the lower confidence of the risk methodologies and the need to improve pressure magnitude and pathway susceptibility data sets, and develop better monitoring of groundwaters. In the 1b risk category the Eastern RBD, South Eastern RBD, South Western RBD and Neagh Bann IRBD reported highest percentages. The Shannon IRBD, Western RBD and North Western IRBD had lowest 1b risk category percentages.

Diffuse source pressures assessed included widespread activities such as agriculture, non-sewered population, leaky sewers and urban land use, transport and some industrial activities.

The emphasis in the groundwater risk assessments is to develop good conceptual understanding of GWBs. Information on pressure magnitudes, pathway susceptibilities and receptor sensitivity (particularly for groundwater dependent terrestrial and surface water ecosystems) was combined in the risk assessments to identify GWB risk categories. The risk assessment methodologies used to examine these diffuse sources including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

Detailed estimates of pollutant types and loads are not yet available in summary form for identified significant diffuse sources. During further characterisation more detailed

estimates of other pollutant types and loads will be gathered for significant diffuse sources in advance of the 2010 Reporting. Nitrogen, phosphorus and, more locally, certain priority substances are important pollutant types from diffuse sources.

An Irish expert group has produced a "Discussion Document - Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" (available at <http://www.wfdireland.ie>) which provides information on the rationale behind the development of a list of dangerous substances and a screening monitoring programme which will include groundwater sites. This is to include monitoring for the full lists of over 200 dangerous substances identified. This will test for the relevance of all candidate parameters and will provide data towards the further requirement to establish EQS levels for Irish waters.

Reporting Sheet Code	GWPI 4
Reporting Sheet Name	Significant point source pollution to groundwater
Prepared by	GK
Reviewed by	GSI
Status	
Date	4 May 2005
Version	3

Table GWPI 4.1 Number of significant point sources in each RBD, and number and percentage of groundwater bodies assessed for each RBD for point pressures resulting in 1a – At significant risk or 1b – probably at significant risk.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of significant point sources ⁴	2	2	1	23	0	3	1
Number of GWBs classed as 1a	2	3	5	19	0	3	1
Percentage of GWBs classed as 1a	3%	2%	6%	8%	0%	4%	4%
Number of GWBs classed as 1b	32	47	36	105	16	13	13
Percentage of GWBs classed as 1b	43%	31%	43%	43%	15%	18%	46%

Table GWPI 4.1 above presents the percentage of groundwater bodies assessed for point pressures resulting in either 1a – at significant risk or 1b – probably at significant risk for each RBD. Significant point sources are defined here as those point sources that result in a 1a risk category. The risk categories used in Ireland are described in Word file IE_gwpi2_text.

In Table GWPI 4 – 1 it is clear that the number of point sources resulting in 1a risk category GWBs is generally low. Note that some of the point sources resulting in a 1a risk category represent large groups of point sources, for example urban areas where the individual point sources have yet to be identified. The proportion of GWBs at 1b risk category is much larger. These GWBs will need to be further characterized to identify the nature and extent of any contamination. Shannon IRBD has the largest proportion of GWBs with 1a risk category. This does not necessarily represent a particular problem of point source groundwater pollution in the Shannon IRBD. Rather it indicates a more detailed point source database available for the Shannon IRBD than for other RBDs at the time of the Article 5 characterisation and risk assessment. More point sources are continually being identified (e.g. illegal landfills) in all RBDs. As point source data become available they will be integrated into the groundwater risk assessments.

⁴ Significant point sources are defined here as those point sources that resulted in a 1a risk category. A water body that is at risk from point sources may be subject to several point sources.

Point source pressures relate to migration in groundwater of pollutants from contaminated land, including sites such as waste disposal sites and oil industry infrastructure, and discharges to groundwaters from mines and soakaways.

The emphasis in the groundwater risk assessments is to develop good conceptual understanding of GWBs. Information on pressure magnitudes, pathway susceptibilities and receptor sensitivity (particularly for groundwater dependent terrestrial and surface water ecosystems) was combined in the risk assessments to identify GWB risk categories. The risk assessment methodologies used to examine these diffuse sources including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

Detailed estimates of pollutant types and loads are not yet available in summary form for identified significant point sources. During further characterisation more detailed estimates of other pollutant types and loads will be gathered for significant diffuse sources in advance of the 2010 Reporting. Nitrogen, phosphorus and, more locally certain priority substances are important pollutant types from diffuse sources.

An Irish expert group has produced a "Discussion Document - Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" (available at <http://www.wfdireland.ie>) which provides information on the rationale behind the development of a list of dangerous substances and a screening monitoring programme which will include groundwater sites. This is to include monitoring for the full lists of over 200 dangerous substances identified. This will test for the relevance of all candidate parameters and will provide data towards the further requirement to establish EQS levels for Irish waters.

Reporting Sheet Code	GWPI 5
Reporting Sheet Name	Significant groundwater abstractions
Prepared by	GK
Reviewed by	GSI
Status	
Date	4 May 2005
Version	3

Table GWPI 5.1 Number and percentage of all groundwater bodies assessed for each RBD for abstraction pressures resulting in 1a – At significant risk or 1b – probably at significant risk. Number of abstraction points, total volume abstracted and abstraction as percentage of long term annual recharge for each RBD.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of GWBs classed as 1a	0	4	0	0	0	0	1
Percentage of GWBs classed as 1a	0%	3%	0%	0%	0%	0%	4%
Number of GWBs classed as 1b	5	3	1	23	7	0	1
Percentage of GWBs classed as 1b	7%	2%	1%	10%	7%	0%	4%
Number of abstraction points	163	156	193	504	186	17	7
Total volume abstracted (m ³ /day)	44334	172463	30582	102384	132924	7672	2881
Abstraction as % of LTA ⁵	1.82	2.4	0.52	0.0062	0.00017	0.29	0.49

Table GWPI 5.1 above presents the percentage of groundwater bodies assessed for groundwater abstractions resulting a GWB being categorised in either 1a – at significant risk or 1b – probably at significant risk for each RBD. Significant abstractions are defined here as those greater than 10m³/day or serving greater than 50 people. The risk categories used in Ireland are described in Word file IE_ gwpi2_text.

Abstractions including public and private water supply and industrial use. Only the South Eastern RBD and Neagh Bann RBD reported GWBs in risk category 1a as a result of groundwater abstractions.

The emphasis in the groundwater risk assessments is to develop good conceptual understanding of GWBs. Information on pressure magnitudes, pathway susceptibilities and receptor sensitivity (particularly for groundwater dependent terrestrial and surface water ecosystems) was combined in the risk assessments to identify GWB risk categories. The risk assessment methodologies used to examine

⁵ LTA = Long Term Annual Recharge. The methodology for this calculation is presented in the Abstraction Pressures Guidance Note available at <http://www.wfdireland.ie>.

these groundwater abstractions including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

Reporting Sheet Code	GWPI 6
Reporting Sheet Name	Significant artificial groundwater recharge
Prepared by	GK
Reviewed by	GSI
Status	
Date	18 March 2005
Version	1

There is no significant artificial groundwater recharge in Ireland.

Reporting Sheet Code	GWPI 7
Reporting Sheet Name	Significant saltwater or other intrusion
Prepared by	GK
Reviewed by	GSI
Status	
Date	18 March 2005
Version	2

Table GWPI 7.1 Number and percentage of all groundwater bodies assessed for each RBD for saltwater intrusion resulting in 1a – At significant risk or 1b – probably at significant risk.

	EA RBD	SE RBD	SW RBD	SH IRBD	WE RBD	NW IRBD	NB IRBD
Number of GWBs classed as 1a	0	0	1	0	0	0	0
Percentage of GWBs classed as 1a	0%	0%	1%	0%	0%	0%	0%
Number of GWBs classed as 1b	0	1	0	1	7	0	0
Percentage of GWBs classed as 1b	0%	1%	0%	0%	7%	0%	0%

Table GWPI 7.1 above presents the percentage of groundwater bodies assessed for groundwater intrusions resulting in either 1a – at significant risk or 1b – probably at significant risk for each RBD. The risk categories used in Ireland are described in Word file IE_ gwpi2_text.

Only the South Western RBD reported a GWB in risk category 1a as a result of groundwater intrusion. The South Eastern RBD and Western RBD reported one and seven GWBs respectively in risk category 1b, which will require further investigation.

The emphasis in the groundwater risk assessments is to develop good conceptual understanding of GWBs. Information on pressure magnitudes, pathway susceptibilities and receptor sensitivity (particularly for groundwater dependent terrestrial and surface water ecosystems) was combined in the risk assessments to identify GWB risk categories. The risk assessment methodologies used to examine these groundwater abstractions including screening criteria and pressure thresholds are available at <http://www.wfdireland.ie>.

Reporting Sheet Code	GWPI 8
Reporting Sheet Name	Further characterisation – Assessment of the impacts on surface water bodies
Prepared by	GK
Reviewed by	GSI
Status	
Date	18 March 2005
Version	2

Note: This Reporting Sheet (17 November 2004, Version 7) states:

“Some Member States appear not to have formally collected data on the environmental impacts caused by significant pressures having interpreted the Directive’s definition of Assessment of Impacts as identification of water bodies at risk. They are therefore unwilling to accept GWPI8 in its current form.

However, the collection of information on the environmental impacts is important at this stage to enable the Commission to judge the effectiveness of future programmes of measures at a later date.

The Commission therefore requests that Member States supply the information at a River Basin District Level on a voluntary basis from 2005. However, detailed information at a water body level should be supplied by 2010.”

On this basis reporting on this sheet is deferred until 2010 when detailed information at a water body level will be provided as required.

Reporting Sheet Code	GWPI 9
Reporting Sheet Name	Further characterisation – summary information
Prepared by	GK
Reviewed by	GSI
Status	
Date	18 March 2005
Version	2

For each of the groundwater bodies initially delineated during the Article 5 characterisation, detailed hydrogeological reports using the principles outlined in Reporting Sheet GWB 1 were prepared by the Geological Survey of Ireland. These principles are explained in detail in the guidance note “Approach to delineation of groundwater bodies” (available at <http://www.wfdireland.ie>). A total of 383 groundwater bodies were delineated using these principles. The hydrogeological reports include the following information:

- Hydrometric area, catchment and associated surface water bodies;
- Groundwater dependent terrestrial ecosystems;
- Topography;
- Geology & Aquifers (incl. main lithologies, structures, properties, thickness);
- Overlying strata (incl. thickness, vulnerability);
- Recharge;
- Discharge (spring systems, abstractions);
- Groundwater flow paths;
- Groundwater and surface water interactions;
- Conceptual Model, summarising main information;
- Identification of all monitoring sites (water quality, water levels, river gauges).

More than 90% of the country is covered by subsoils. These provide the protecting, filtering layer over groundwater and also influence recharge. However, they are highly variable in distribution, composition, permeability and thickness. The main subsoil types, and the proportion of the land surface covered by each type, are as follows: glacial till (62.5%), sand/gravel (4.3%), alluvial sediments (0.6%), lacustrine silts and clays (0.4%), beach/wind blown sediments (0.2%), peat (18.9%) and made ground (1.2%). The remainder of the land surface (11.9%) consists of outcrop (defined as <1m soil/subsoil).

Subsoil permeability maps, subdividing the subsoils into three permeability categories – high, moderate and low – were available for ~40% of the country. For the remainder of the country, subsoil permeability has been estimated, although with a considerable level of uncertainty.

Soil maps were produced, subdividing soils into ‘wet’ or ‘dry’, and ‘acid’ or ‘basic’. While the areas of ‘wet’ soils are underestimated in places, these maps provide an essential component of the physical characterisation and risk assessment.

In karstified GWBs, bypassing of the overlying protecting layers may occur at karst features, such as swallow holes. Mapping and compilation of these features has been undertaken for certain counties.

Vulnerability maps were available for ~50% of the country. For the remainder, the 'extremely' vulnerable areas (i.e. areas with <3m soil/subsoil above bedrock) were mapped, since pressures in such areas pose the greatest threat to groundwater.

Where point pollution sources or the predicted impact on groundwater dependent ecosystems placed limited areas within groundwater bodies 'at risk', new groundwater bodies were delineated using hydrogeological boundaries, giving a total of 757 groundwater bodies. A large proportion of the groundwater bodies classified as 'at risk' are in the 1b (probably at risk) category. These groundwater bodies require further detailed hydrogeological investigations to confirm their risk category, in advance of the publication of the draft river basin management plans in 2008. More detailed hydrogeological reports along the lines of those described above will be prepared by the River Basin District projects for these sub-delineated groundwater bodies during this period.

Reporting Sheet Code	GWPI 10
Reporting Sheet Name	Uncertainties and data gaps
Prepared by	GK
Reviewed by	GSI
Status	
Date	18 March 2005
Version	2

The two risk categories where confidence is lower (1b - **probably at risk** or 2a - **probably not at risk**) represent a significant proportion of groundwater bodies nationally (70%). This highlights the significant uncertainties and data gaps which currently exist in determining risk with a satisfactory degree of certainty for all water bodies. An urgent task facing Irish authorities will be to address these uncertainties and data gaps to increase the confidence in the risk assessment in time for the first draft River Basin Management Plans in 2008.

The water bodies in category **1b - probably at risk** will receive higher priority, which will entail the intensive and focused collection of key datasets to confirm the risk category by 2008. This will also inform the development of measures if the water body is confirmed to be at risk.

The water bodies in category **2a - probably not at risk** are of lower priority and will be investigated further, involving less intensive, but targeted data collection to confirm the absence of a significant risk.

Generally these uncertainties and data gaps will be addressed by:

- Delivery of water status classification schemes in 2006.
- Implementation of monitoring programmes by 2006 applying the new water status classification scheme.
- Collection of additional key **driving force, pressures, state**, pathway susceptibility, receptor sensitivity, and **impact** datasets necessary to complete the risk assessment with a high level of confidence.
- Improvements in risk assessments using modelling techniques to maximise use of all available data.
- Formulation of **responses** (Measures) taking into account economic aspects, thus providing the most cost effective options for achieving good status in each water body.

Table GWPI 10.1 below provides details on uncertainties and data gaps and the proposed next steps.

Table GWPI 10.1 Review of Impacts of human activities for groundwaters (Uncertainties, data gaps and next steps)

Topic/Issue	Uncertainty / Data Gap	Next Step
Driving forces	Driving Forces need to be quantified at water body level (e.g. population growth, future changes resulting from reform of the Common Agricultural Policy, future changes as a result of implementation of the Nitrates Action Programme).	See Economic strategy in Reporting Sheet SWPI 8
Pressure/Activity <i>Water abstraction</i>	A number of unregulated activities abstract water – the impact of these activities is unknown but may be significant in certain cases	Improved monitoring and/or management of these activities will be considered
	The low flow water resource has been estimated based on a screening tool	Better hydrological data or models are required to increase the confidence in this assessment
Point source pollution	The point source risk assessments were dependent on available monitoring data; in certain cases (for example Section 4 industries) compliance datasets were not readily available	Facilities monitoring programmes will have to be improved to increase the confidence in this assessment
	Some key datasets are not available, for example farmyard storage facility assessments	These data would inform future assessments of agricultural risk
	Applied thresholds were dictated by available datasets - this means that some significant pressures might not be included (e.g. overflow from urban areas below 2000 population are excluded on the basis that locations are not readily available in GIS format)	Further characterisation will refine the level of detail included in the assessments
	More quantitative assessment of significant pressures will be required to consider the broader objectives of the WFD	Existing licences may have to be reviewed and modeling for licence consents may have to be introduced
<i>Diffuse source pollution</i>	The resolution of data available to some of the diffuse pollution assessments was limited (for example agricultural data is based on information at District Electoral Division level and therefore does not accurately represent farm level variations)	Higher resolution datasets will need to be generated to increase confidence in risk assessments
	More quantitative assessment of significant pressures will be required	Numerical modelling of diffuse pollution pressures will be undertaken

Table GWPI 10.1 (continued) Review of Impacts of human activities (Uncertainties, data gaps and next steps)

Topic/Issue	Uncertainty / Data Gap	Next Step
Pathway susceptibility	The mapping of 'wet' soils and 'extremely' vulnerable areas was incomplete for some areas when the risk assessment was undertaken.	Completion by end 2005.
Receptor sensitivity	Assumptions were made concerning the sensitivity of estuaries and certain GWTDEs.	Further data collection and analysis will be needed to clarify issues regarding receptor sensitivity.
State		
General pollutants	Pollutant monitoring data are not currently available for all water bodies categorised as (1a) at risk or (1b) probably at risk	Monitoring will need to be extended to cover all water bodies identified as (1b) probably at risk
Dangerous substances	The issue of dangerous substances is a significant data gap/area of uncertainty in Ireland. Currently there is an inability to quantify the range of substances and annual load of pollutants. Consequently, there is lower confidence in the risk assessments related to dangerous substances.	The lack of data in relation to dangerous substances will be addressed by additional data collection and monitoring for the first river basin management plans. A National Substances Screening Monitoring Programme is to start in early 2005. This is to include monitoring for the full lists of over 200 dangerous substances identified.
Impact	More data will be required for groundwater bodies to assess impact	Future monitoring programmes will have to cover all elements included under the WFD and to focus particularly on 'at risk' water bodies
Risk Assessment Procedures	The initial characterisation has identified key pressures based on screening or semi-quantitative assessments – more quantitative approaches are required.	Groundwaters will require more detailed assessment including investigative monitoring and numerical modelling studies during the further characterisation process

Reporting Sheet Code	GWPI 11
Reporting Sheet Name	Recommendations for monitoring
Prepared by	GK
Reviewed by	GSI
Status	
Date	18 March 2005
Version	2

The first step in the development of monitoring programmes is a review of existing networks and systems. The EPA is currently assessing the representativity of the national groundwater monitoring network, thereby ensuring the suitability of sites for inclusion in the groundwater programme. Guidance on groundwater monitoring and assessment of existing networks is available as a background document at <http://www.wfdireland.ie>.

The development of monitoring programmes will need to go hand in hand with further characterisation and refinement of the risk assessments. As mentioned in GWPI 10, a large proportion of Ireland's groundwater bodies are classified in the risk categories where confidence is lower (1b – probably at risk or 2a – probably not at risk). The risk category of these water bodies will need to be resolved for the finalisation of monitoring programmes for 2007 and to ensure that appropriate measures are developed for the first draft of the river basin management plans in 2008.

An Irish expert group on dangerous substances produced a "Discussion Document - Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" (available at <http://www.wfdireland.ie>); this document provides information on the rationale behind the development of the list and the monitoring programme.

A National Dangerous Substances Screening Monitoring Programme is to start in early 2005 to address this data gap and will include groundwater sites. This is to include monitoring for the full lists of over 200 dangerous substances identified. This will test for the relevance of all candidate parameters and will provide data towards the further requirement to establish EQS levels for Irish waters.

Reporting Sheet Code	ECON 1
Reporting Sheet Name	Economic Analysis
Prepared by	GK
Reviewed by	CDM
Status	
Date	18 March 2005
Version	2

An economic baseline scenario has been established that describes the current and future projected benefits and costs of water resources in the Republic of Ireland nationally and in each of its RBDs. A report on the findings of this work and proposed future work is available as a background document at <http://www.wfdireland.ie>.

Socio-economic importance of water use

The various industrial users of water contribute considerably more to the national economy than either the agricultural or the other miscellaneous water-using sub-sectors that were analysed. The relative economic importance of these different user groups varies significantly between RBDs.

At the national level, the estimated consumption, and thus value, of abstractive water (i.e. the amount the user is willing to pay) to the domestic sector exceeds that of both the agricultural and industrial water-using activities that were analysed. For each unit of water used, the economic value of output from key industrial users is significantly higher than from the key agricultural users.

Beach visits and other water based leisure activities such as recreational fishing, boating, aquatic bird watching, etc. are relatively significant economic activities in Ireland. Estimates of willingness to pay for the conservation or restoration of wetlands and Special Riparian Areas (SRAs), or areas protected for conservation reasons, vary widely across RBDs. These estimates are based on international surveys converted to the applicable Irish populations and hectarages. Due to the amount of wetlands and SRAs in the Shannon-IRBD and Western-RBD values they generally show the highest non-use value among the RBDs.

Costs and costs recovery of water services

Government policy and national legislation currently prohibit direct charges for water services for the domestic sector. In terms of cost recovery for the provision of public water services to all sectors, there is a significant shortfall of revenue across the reporting sub-groups:

Public water supply – 71% recovery

Public sewerage schemes – 28% recovery

Administration & miscellaneous – 15% recovery.

The Private Installations are the exception with 96% recovery.

The gap between expenditures on water services and the costs recovered has grown in recent years. Cost recovery from public water schemes declined from 78% in 1999 to 71% in 2003 (equating to a budget shortfall growth of €48.3 million in 1999 and

€8.3 million in 2003). In 2003 there were an estimated 183,650 non-domestic users of public water and wastewater services in Ireland. The charge averaged across all local authorities was €0.96/m³, but there was considerable variability. The local authorities charging the highest per unit costs are not always those experiencing the highest water production costs. The only available estimate of environmental/resource cost is €1,380,887,402 for the period between 2004 and 2012. These estimates vary considerably between the RBDs.

Projections of demand, supply capacity, and costs of water services

Annual water demand in Ireland is projected to increase by 76,707 million litres by 2015. However, unaccounted for water (leakage, illegal connections, etc) is projected to decline by at least 65,494 million litres (excluding Dublin) over the same period, resulting in the projections for net increases in national water demand being negligible.

The National Urban Wastewater Study concluded that 48% of the wastewater treatment plants in Ireland would be adequate to treat future projected loadings in year 2022. 85% of wastewater treatment plants studied in 2002 currently limit discharges to meet environmental quality objectives in the receiving waters. This should contribute to the objectives of the WFD which requires a combined approach to discharges (Environmental Quality Objectives and discharge limits). Nationally, if 1999-2003 trends hold, the cost of water services will increase by 75% by 2015.

Water Resource and Economic Impacts by Major Sector

The beneficial economic impacts of major sectors in terms of gross output values are being examined in the context of the results of the risk assessment tests on surface waters.

Further information on this analysis and economic issues generally are available in the Economic Analysis of Water use in Ireland report and the National Summary Report on Article 5 available at <http://www.wfdireland.ie>.

Uncertainties and data gaps

Reporting Sheet SWPI 9 (Word file IE_SWPI9_text_v1) describes the uncertainties and data gaps associated with the Economic Analysis of Water Use and the proposed next steps to address them.

Reporting Sheet Code	RPA 1
Reporting Sheet Name	Register of Protected Areas
Prepared by	VK
Reviewed by	GK
Status	
Date	18 March 2005
Version	1

Geographic Information

ESRI shape files for Register of Protected Areas:

A readme file is included with RPA shapefiles to describe all geographic elements.

Summary of the Community, national or local legislation under which the protected areas have been designated

Article 6 of the Water Framework Directive (2000/60/EC), requires each Member State to establish a “*register or registers of all areas lying within each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water*” (Article 6.1, 2000/60/EC).

In Ireland, this Register has been compiled on a national basis by the Irish Environmental Protection Agency (EPA). In order to ensure that the Register contains the most accurate and appropriate data for each protected area, the EPA has sought expert advice from the different, relevant agencies and organisations for each of the individual topics included within the Register. Not only has this process has proved valuable in attaining the most correct information on each of the different protected areas, but also this process has opened and established links between organisations that will facilitate the maintenance and update of the Register in the future.

The Irish Register of Protected Areas is based exclusively upon existing national and EU legislation regarding the protection of waters for economic, recreational and ecological purposes. The Register is held in two formats – an MS Access database and a Geographical Information System (GIS). Each of the geographical features within the Register is based upon a standard, national GIS feature dataset and coding system and as such, each of the GIS datasets within the Register can be fully integrated within the national GIS database.

Areas designated for the abstraction of water intended for human consumption

In Ireland, waters intended for human consumption are protected under the Drinking Water Regulations (S.I. 439 / 2000)⁶. The actual protected areas for drinking waters are not outlined within the Regulations, as a result, the protected area for drinking waters is represented by the water body from which the water is abstracted and the

⁶ European Communities (Drinking Water) Regulations, 2000. S.I. No. 439 of 2000.

associated drinking water abstraction point. The entire water body is to be used to represent the protected area (groundwater body, lake or river). Where water is abstracted from a river or lake that was not initially selected as a water body (i.e. 1st or 2nd order rivers or lakes smaller than 50 hectares) the water is then designated as a protected area and the 1st or 2nd order stream or small lake is reclassified as a water body.

Areas designated for the protection of economically significant aquatic species (fish, shellfish)

The protected areas for economically significant aquatic species are comprised of the 14 shellfish production areas listed in the Irish Shellfish Regulations (S.I. 200 / 1994)⁷. These areas are currently under review. The geographic extents of these areas have been verified by Bord Iascaigh Mhara (BIM)⁸ and incorporated within the Register GIS and database.

Areas designated as recreational and bathing waters

Only bathing waters have been included within the Register as recreational waters. Protected areas for bathing waters include those 131 bathing areas listed in the Bathing Waters Regulations (S.I. 155 / 1992)⁹ and subsequent amendments¹⁰. The location of bathing water monitoring point locations and the lengths of beach that are associated with those monitoring points have been verified by each of the relevant Local Authorities.

Nutrient-sensitive areas

The nutrient sensitive areas included within the Register are those waters listed in the Urban Waste Water Treatment (UWWT) Regulations (S.I. 254 / 2001)¹¹. The waterbody containing the sensitive area is used to represent the nutrient sensitive area. A Nitrates Action Programme has been prepared in accordance with Article 5 of the Nitrates Directive (91/676/EEC) and is to be applied to the whole territory of the State. Consequently no NVZs have been designated.

Areas designation for the protection of habitats (including birds)

Salmonid waters, Special Areas of Conservation (SACs, cSACs, pcSACs) and Special Protection Areas (SPAs and pSPAs) will be included within the Register as areas protected for water dependent species and habitats. The protected areas for Salmonid species are comprised of the 34 Salmonid rivers, tributaries and lakes listed in the

⁷ Quality Of Shellfish Waters Regulations, 1994. S.I. No. 200 of 1994.

⁸ BIM is "the Irish State agency with responsibility for developing the Irish Sea Fishing and Aquaculture industries. BIM was established under the Sea Fisheries Act 1952" From http://www.bim.ie/templates/about_bim.asp?node_id=179. Last viewed 17 Dec 2004.

⁹ Quality Of Bathing Waters Regulations, 1992. S.I. No. 155 of 1992.

¹⁰ Since the publication of S.I. 154 of 1992 there have been 4 subsequent amendments to the Bathing Water Regulations. As a result of these amendments, the number of protected areas has been increased from the original 94 to 131 bathing waters in S.I. 22 / 2001 (<http://www.irishstatutebook.ie/front.html> Last viewed 17 Dec 2004.)

¹¹ Urban Waste Water Treatment Regulations, 2001. S.I. No. 254 of 2001.

Salmonid Regulations (S.I. 293 / 1988)¹². The Salmonid Regulations designate the “*waters capable of supporting salmon (Salmo salar), trout (Salmo trutta), char (Salvelinus) and whitefish (Coregonus)*” as protected. In contrast, the Habitat regulations (S.I. 94 / 1997)¹³ protect the habitats of Atlantic Salmon only. For this reason, the Salmonid Regulations are contained within the Register independently from the Habitat Regulations.

Only the SACs that contain water dependent species and habitats have been included within the Register. In some cases, the actual extent of water dependent habitats and species within certain SACs is unclear. Where this is the case, the entire SAC has been included within the Register. Where a 1st or 2nd order stream or a lake smaller than 50ha (i.e. not already considered to be a water body) exists within a Salmonid Water, an SAC or SPA and is listed as a qualifying interest, this 1st or 2nd order stream or small lake must be reclassified as a water body. All bird SPAs contain water dependent species.

¹² European Communities (Quality Of Salmonid Waters) Regulations 1988. S.I. No. 254 of 1988.

¹³ European Communities (Natural Habitats) Regulations, 1997. S.I. No. 94 of 1997.