

Neagh Bann River Basin Management Plan

# Carlingford Lough Classification

December 2009



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Northern Ireland  
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RIVER BASIN MANAGEMENT PLAN



WFD COASTAL WATER BODY CLASSIFICATION  
Carlingford Lough

Version Date: 22/12/09

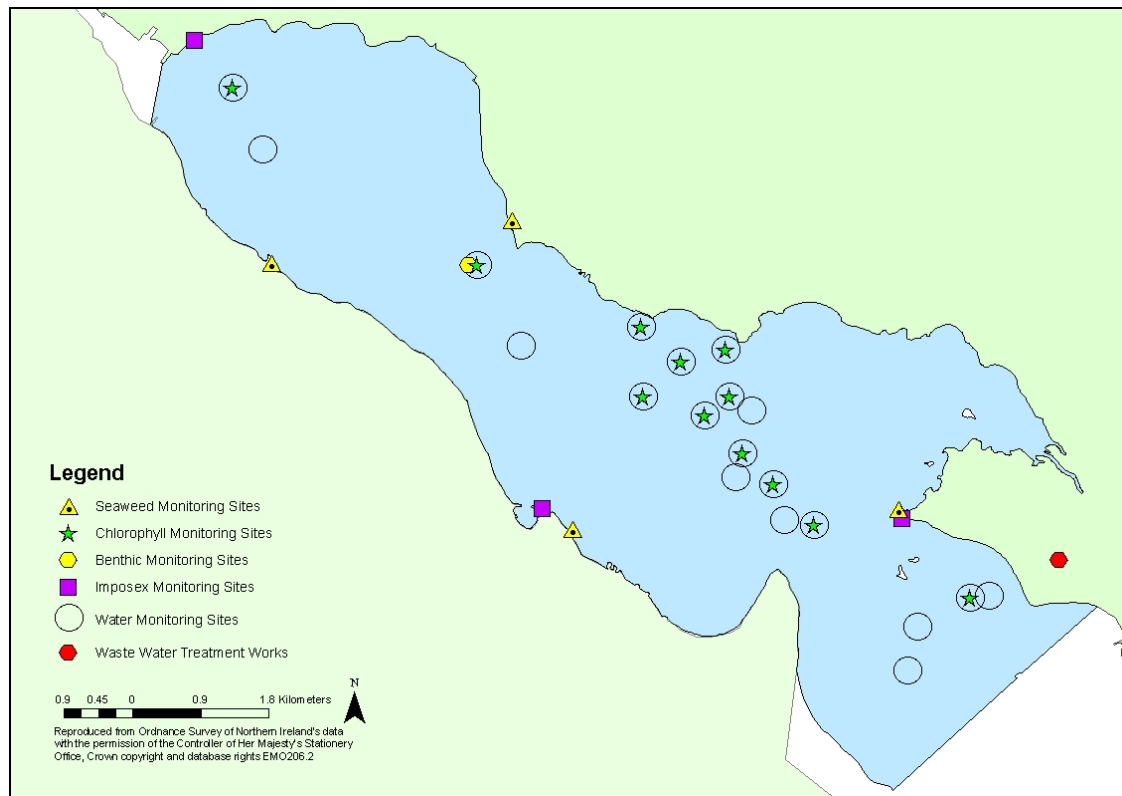
MARINE ASSESSMENT AND LICENSING TEAM

**CARLINGFORD LOUGH**

Water body Information

- River Basin District: NBIRBD
- Water Body Code: UKGBNIIIE6NB030
- Water body type: CW8
- Water body characteristics: Euhaline, mesotidal, sheltered
- Water body area: 48.66 km<sup>2</sup>
- Heavily Modified Water Body: No

<b>OVERALL WATERBODY CLASSIFICATION</b>	<b>(H/G/M/P/B): (PASS/FAIL):</b>	<b>MODERATE FAIL</b>	
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Map showing waste water outfalls and monitoring points within Carlingford Lough (Coastal Water).

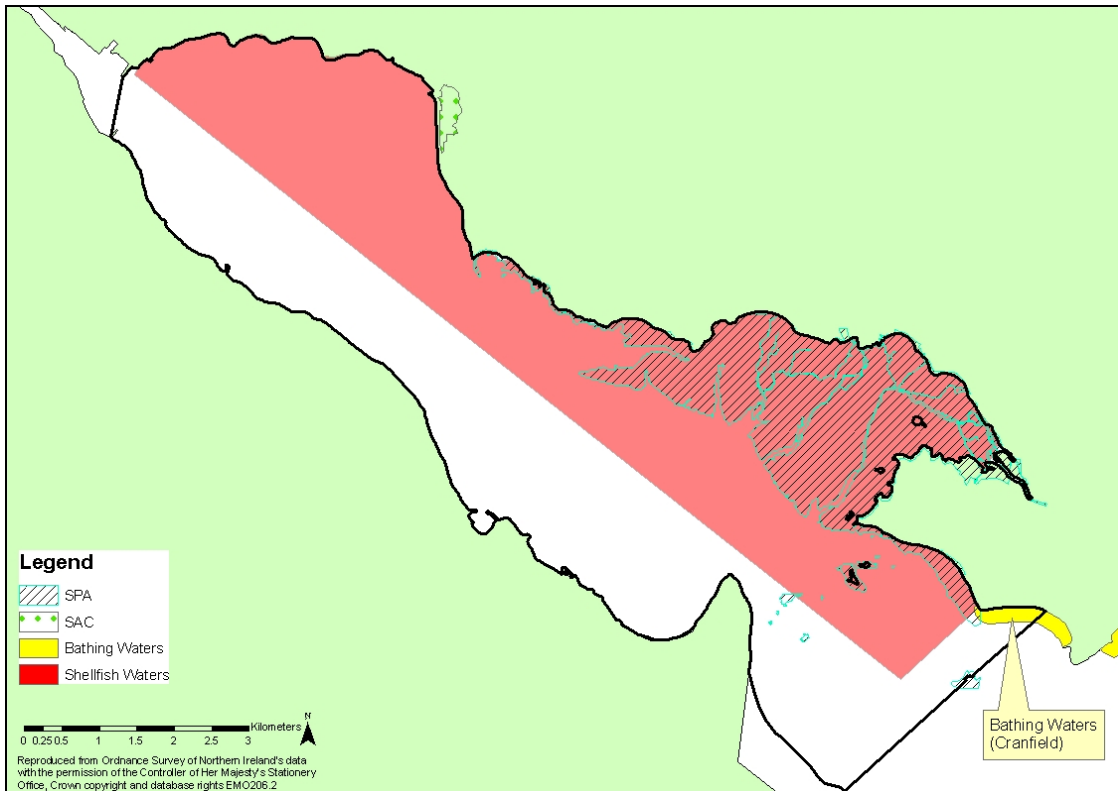
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Map showing protected areas within Carlingford Lough (Coastal Water), see Annex F.

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**PARAMETERS TABLE**

Parameters for which classification systems are available and have been used in the first round of classification. Some biological assessment tools are not suitable for all water bodies due to habitat type.

Ecological Quality Element			
Main Element	Sub-Element	Applied	Comment
Phytoplankton	Biomass	✓	
Macroalgae (Seaweeds)	Opportunistic Macroalgae	☒	
	Reduced Species List	✓	
Angiosperms	Seagrass	☒	
	Saltmarsh	Assessed under protected areas.	See Annex F
Benthic Invertebrates	Infaunal Quality Index	✓	
	Imposex	✓	
Physico-chemical (Water)	-Dissolved Oxygen	✓	
	-Nutrients	✓	
	Specific Pollutants (Annex VIII substances)	✓	
Hydromorphological Quality Elements	SEPA Rapid Designation	✓	
	TraC MIMAS	✓	
Chemical Status			
Priority Hazardous Substances	Annex X substances	✓	

**Waterbody Classification**

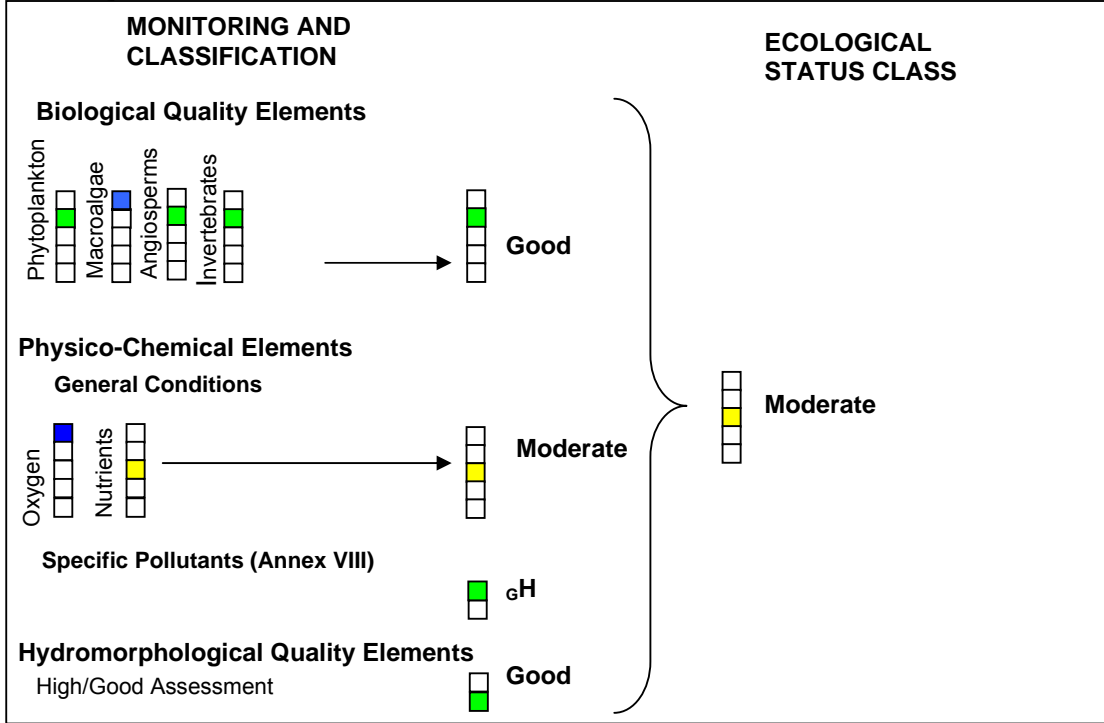


Figure showing ecological classification of Carlingford Lough.

**Ecological Status**

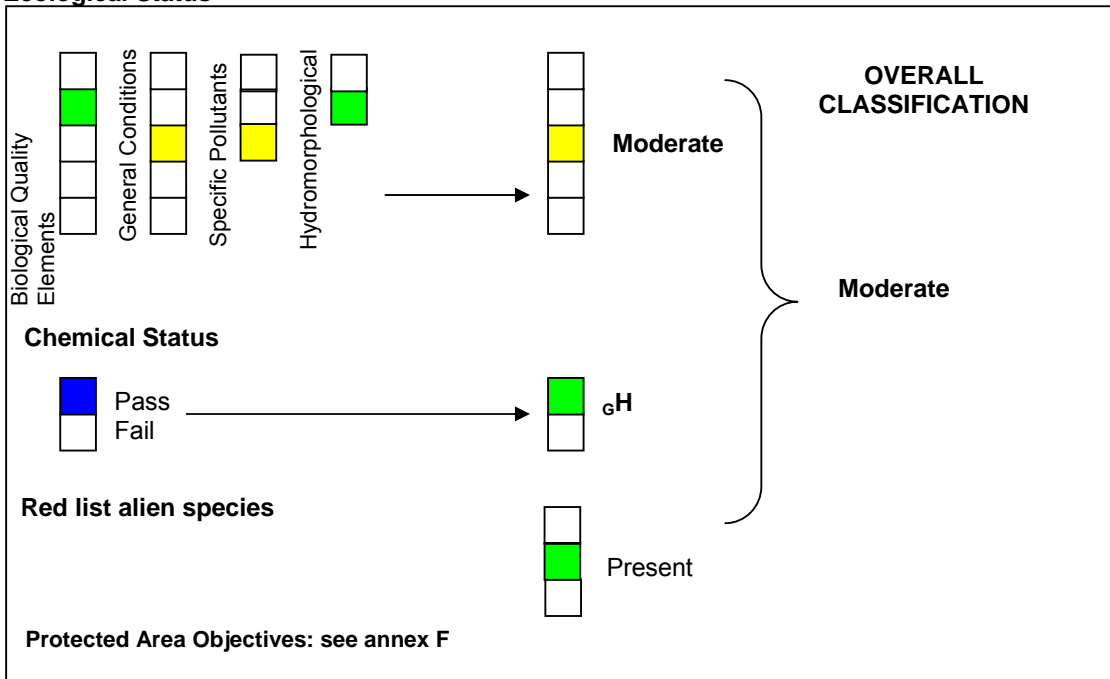



Figure showing overall classification of Carlingford Lough (Coastal Water).


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**First River Basin Cycle (2004 – 2008)**

*Monitoring Level: Surveillance*

Sampling frequency for each quality element

Quality Elements		Year (If 1 in 3 yrs)	No of Sites
<b>Biological</b>			
Phytoplankton		2004-7	103 samples 23 sites
Macroalgae (Seaweed)	Reduced Species List	2007-8	4 sites 5 surveys
Benthic Invertebrates	Infaunal Quality Index	2004-6	1 site 15 samples
	Imposex	2007	3 sites
<b>Physico-chemical</b>			
Nutrients		2003-2008	79 samples 21 sites
Salinity		2003-2006	13
Temperature		2003-2006	13
Dissolved Oxygen (DO)		2007-8	183 samples
Specific polluting substances (Annex VIII)		2002-6	9
<b>Hydromorphology</b>		2007	
<b>Water chemistry</b>			
(Annex X)		2002-6	9

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## ANNEX A: Classification of Biological Quality Elements

### CARLINGFORD LOUGH

#### QE: Phytoplankton

<b>QE phytoplankton assessment (+ data confidence):</b>	<b>GOOD (H)</b>	
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#### Classification tools:

1. Chlorophyll biomass index (90%ile).
  2. Species composition, abundance and bloom frequency will be reported in the next classification round.
  - 3.
- Data store (classification):  
MARINE\Water Framework Directive\DRAFT WFD CLASSIFICATION REPORTS\QE Phytoplankton\Chlla 90th Percentile\Final 90th Percentile Phytoplankton- MARINE\Water Framework Directive\DRAFT WFD CLASSIFICATION REPORTS\QE Phytoplankton\Elevated Taxa\chl phyto wfd 2004- combined
  - Data Availability (spot & continuous samples):  
Phytoplankton = spot (2001-2007)  
Chl = spot (2004-2007) AFBINI & NIEA

#### **1. Chlorophyll Biomass Index - 90%ile (Chl $\mu\text{g l}^{-1}$ )**

(Growing Season 1<sup>st</sup> Mar – 30<sup>th</sup> Sept)

Waterbody Chl. biomass assessment: *GOOD (H)*

#### Thresholds:

Water Ref. Area		Status				
		High	Good	Moderate	Poor	Bad
North/Irish Sea	Chl $\mu\text{g l}^{-1}$	<5	5-10	10-15	15-20	>20
	EQR	0 -1.0	1.0-0.8	0.8-0.6	0.6-0.4	0.4-0.2


#### Results:

90%ile	Status	Data Years	Data Quality	No. of daily averages	No. of Sites	No. of Samples	Data Confidence (proportion of possible months with data*)
8.00	GOOD	2004-2007	High	31	23	103	89.3%

\* proportion of possible months (of growing season in years assessed) for which data are available

Data confidence: High

- The proportion of possible months sampled is high, yielding good temporal coverage, and spatial coverage was also good for the waterbody over this period when AFBINI and NIEA data were combined.

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### QE: Macroalgae Carlingford Lough

QE macroalgal assessment (+ data confidence):	HIGH (M)
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Classification tools: 1. Reduced species list (RSL)  
2. Macroalgal Blooming Tool (MBT) – not assessed.

Waterbody RSL assessment: HIGH (Medium)

#### Reduced Species List (RSL)

- WFD surveillance monitoring: 2007, 2008
- Data Availability (classification): 2007- 2 sites, 2008 - 3 sites
- Data Store: G:\MARINE\Projects 07\MM07-03 Marine Plants\Macrophyte Survey 07
- G:\MARINE\Projects 08\Marine Macrophytes

#### Boundaries:

Parameters	Quality Status	Bad	Poor	Moderate	Good	High
	Sub-metric quality status	0.0 – 0.2	0.21 – 0.4	0.41 – 0.6	0.61 – 0.8	0.81 – 1.0
Species richness (adj. for shore)		0 – 3	3 – 10	10 – 20	20 – 34	34 – 68
Proportion of Chlorophyta (% G)		80 – 100	45 – 80	30 – 45	20 – 30	0 – 20
Proportion of Rhodophyta (% R)		0 – 10	10 – 25	25 – 35	35 – 45	45 – 100
Ecological Status Group ratio (ESG)		0.0 – 0.2	0.2 – 0.4	0.4 – 0.6	0.6 – 0.8	0.8 – 1.2
Proportion of opportunists (% opp)		50 – 100	35 – 50	25 – 35	15 – 25	0 – 15


#### Results

Shore	Sub-Metric EQR							RSL EQR	Status
	Shore desc.	Sp. richness	Adj. Sp. Richness	% G	% R	ESG	% Opp		
Killowen 2007	10	35	47.6	8.57	62.86	0.94	11.44	0.855	HIGH
Greencastle 2007	13	47	53.6	17.02	53.19	0.96	12.77	0.829	HIGH
Carlingford Public Slipway 2008	12	36	43.6	19.44	47.22	1.00	13.90	0.803	HIGH
Greer's Quay 2008	14	31	37.5	19.35	45.16	1.21	22.58	0.775	GOOD
Greencastle 2008	13	43	49.0	13.95	51.16	0.87	11.63	0.828	HIGH
<b>Mean</b>								<b>0.82 ±0.03</b>	<b>HIGH</b>

#### Data Confidence: Medium

- Standard Deviation (±) are included with the mean EQR
- Data QA (expert team)
- WFD specific data (Reduced species list completed; Full species list not yet carried out, tool not yet completed).
- Four shores over 2 years (poor temporal trend assessment)

Alien taxa present: *Sargassum muticum*, *Spartina anglica*.

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**QE: Angiosperms – Carlingford**

QE Angiosperm assessment: GOOD (ND)

**QE: Benthic Invertebrates – Carlingford Lough**

<b>QE benthic invertebrate assessment (+ Data confidence):</b>	<b>GOOD (MED)</b>	
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**Classification tools:** 1. Infaunal Quality Index (IQI) GOOD  
2. Imposex tool (VDSI) - GOOD

**1. IQI (v4)**

Water body IQI assessment: Good (Medium)

- Data store:
  - UNICORN (NMMT) Database
  - Supporting Parameters: Particle Size Analysis (PSA), Water Quality Data Set
  - Digital images: AMAP Project folder
- Data Availability (classification): CL2 for 3 years, (5 reps), Day grab (0.1m<sup>2</sup>), 1mm mesh
- Habitat max values (sub-tidal mud): 1-(AMBI/7) = 0.78, 1-Lambda' = 0.72, Taxa = 24

Boundaries (Intercalibrated NEAGIG):

Class	Bad	Poor	Moderate	Good	High
<b>IQI</b>	>0.0 ≤0.24	≥0.24 <0.44	≥0.44 <0.64	≥0.64 <0.75	≥0.75


**Results**

Year	Survey	Station	n	Mean	± S.D	Status
2004	MM-Benthos	CL2	5	0.67	0.02	Good
2005	MM-Benthos	CL2	5	0.7	0.04	Good
2006	MM-Benthos	CL 2	5	0.62	0.07	Moderate
<b>Overall Mean</b>				<b>0.66</b>		<b>Good</b>

Data confidence: MEDIUM

- Sample analysis QA'd through NMBAQC (Good)
- Database QA'd (Good)

Alien taxa present: *Didemnum* sp. and *Crassostera gigas* (proposed red list species),

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### Carlingford Lough

#### 2. VDSI (*Nucella lapillus*)

Waterbody VDSI assessment: Good (M)

- Data store: NIEA imposex shoreline data.xls; MERMAN
- Data availability: 2004/2007 NI survey

Boundaries:


Class	Moderate	Good	High
<b>VDSI</b>	≥4.0	≥0.3 <4.0	<0.3
<b>EQR</b>	<0.33 -0	≥0.33 <0.95	0.95 – 1.0

Results:

Year	Shore	VDSI	EQR	Status
2007	Carlingford	1.78	0.70	Good
2007	Greencastle	2.88	0.52	Good
2007	Warrenpoint	2.35	0.61	Good

Data confidence: Medium

- Sample analysis QA through QUASIMEME (High)
- ≥3 sites (High)
- One assessment period (2007)

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## ANNEX B: Classification of physico-chemical Quality Elements: General

### Dissolved Oxygen

Dissolved oxygen (+ data confidence):	HIGH (M)	
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Classification tools: Comparison of 5% ile against reference standards

- Data store: \\marine on ehslis2k \Water Framework Directive\DRAFT WFD CLASSIFICATION REPORTS\Dissolved Oxygen
- Data Availability: 2007 to 2008
- Data Availability (spot & continuous samples): Spot & Continuous

Thresholds:

WFD Status	Marine 5%ile	Objectives
HIGH	≥5.7 mg/L	All life stages of salmonids and transitional fish
GOOD	≥4.0 <5.7 mg/L	Presence of salmonids and transitional fish
MODERATE	≥2.4 <4.0 mg/L	Most life stages of non-salmonid adults
POOR	≥1.6 <2.4 mg/L	Presence of non-salmonids, poor survival of salmonids
BAD	<1.6 mg/L	No salmonids present, marginal survival of resident species


Results:

5% ile DO (mg/L)	Status	Data years	Data Quality	No. of daily averages	Data Coverage (proportion of possible months with data*)
6.88	HIGH	07/08	**	183	66%

\* Proportion of possible months for which data are available

\*\*Data Quality: Medium

- Instruments subject to regular calibration checks and quality assurance programme, but databases not QA'd.
- Medium: 5 – 10 (daily averages) x n (no. of assessment years in reporting cycle)

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**Nutrients – Winter Dissolved Inorganic Nitrogen (DIN)**

<b>Winter DIN assessment (+ Data confidence):</b>	<b>MODERATE (MED)</b>
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- Data store: \\marine on ehs\is2k\Water Framework Directive\Nuala-Lesley Nutrients\DIN for Classification\Coastal Water
- Data Availability: 2003 to 2008, DIN & salinity (November to February)
- Data Availability (spot & continuous samples): spot


**Winter DIN thresholds:**

Area	Salinity range	DIN (uM)		
		HIGH	GOOD	MODERATE
Coastal (at salinity 32)	30-34.5	<12	≥12 ≤18	>18

**Results:**

Mean Winter DIN (uM) (normalised to salinity 32)	Winter DIN Daily average (n)	No. of samples (n)	No. of sites	Data Years	Data Quality	Status
23.96	21	79	21	2003 - 2008	Database not yet QA'd	Moderate

**Data confidence:** Medium

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**ANNEX C: Classification of physico-chemical quality elements: Specific Pollutants (Annex VIII)**

Specific pollutants assessment (+data confidence)	gH (L)	
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**Classification tools:** Comparison with EQS levels.

**Data Availability:** 2003-2007 Shellfish Waters Monitoring, 2007 WFD. Dedicated Monitoring Determinants are being assessed on a rolling programme.

**Data confidence:** Low until 2008 WFD data incorporated.

\* Data previous to 2006 was not considered in the assessment due to improvements to adjacent waste water treatment works.

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ANNEX VIII	Value					EQS ug/l	Ecological Status
	2003	2004	2005	2006	2007		
111_tri	ND	ND	ND	ND	ND		
112_tri	ND	ND	ND	ND	ND		
24_D	ND	ND	ND	ND	ND		
2_chloro	ND	ND	ND	ND	ND		
4_chloro_3	ND	ND	ND	ND	ND		
ammonia	ND	ND	*	19.89	16.15	21	GH
As	1.122	1.151	1.12	ND	1.00	25	GH
Bentazone	ND	ND	ND	ND	ND		
biphenyl	ND	ND	ND	ND	ND		
boron	ND	ND	ND	ND	ND		
chlorine	ND	ND	ND	ND	ND		
chloronit	ND	ND	ND	ND	ND		
chloronit_calc	ND	ND	ND	ND	ND		
Cr	ND	ND	ND	0.07	0.26	0.6	GH
Cu	0.699	0.622	0.50	1.43	0.63	5	GH
Cy	ND	ND	ND	ND	ND		
Cyfluthrin	ND	ND	ND	ND	ND		
cyper	ND	ND	ND	ND	ND		
diazinon	ND	ND	ND	ND	0.001	0.01	GH
dichlorvos	ND	ND	ND	ND	ND		
dimethoate	ND	ND	ND	ND	ND		
fenitrothion	ND	ND	ND	ND	0.002	0.01	GH
Fe	ND	ND	ND	ND	ND		
linuron	ND	ND	ND	ND	ND		
malathion	ND	ND	ND	ND	0.0025	0.02	GH
Mn	ND	ND	ND	ND	ND		
mecoprop	ND	ND	ND	ND	ND		
permethrin	ND	ND	ND	ND	ND		
phenol	ND	ND	ND	ND	<4	7.7	GH
toluene	ND	ND	ND	ND	ND		
Vn	ND	ND	ND	ND	ND		
xylenes	ND	ND	ND	ND	ND		
Zn	5.644	1.274	2.13	4.58	1.69	40	GH

<b>G</b>	Good		Mean includes LOD data
<b>F</b>	Fail		Mean based on actual values
<b>GH</b>	Good or better and is normally treated as high		
<b>M</b>	Moderate		


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**ANNEX D: Hydromorphological quality elements**

Overall hydromorphology assessment	GH	
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Classification tools:

1. TRaC Hydromorphology metrics
2. MIMAS

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## ANNEX E: Chemical Status – Annex X Chemicals

Specific pollutants assessment (+data confidence)	gH (L)	
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Classification tools: Comparison with EQS levels.

Annex X: Overall Compliance	Pass
Annex X: Pass/Fail	Pass

Data Availability: 2003-2007 Shellfish Waters Monitoring, 2007 WFD Dedicated Monitoring.  
Determinants are being assessed on a rolling programme.

Data confidence: Low until 2008 WFD data incorporated.

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ANNEX X	Value					EQS	Chemical Status	Ecological Status
	2003	2004	2005	2006	2007			
12_Dichloro	ND	ND	ND	ND	ND			
anthracene	ND	ND	ND	ND	ND			
atrazine	ND	ND	ND	ND	0.001	0.6	G	GH
benzene	ND	ND	ND	ND	ND			
benzo	ND	ND	ND	ND	ND			
benzo_a	ND	ND	ND	ND	ND			
Cadmium	0.0255	0.0378	0.019	0.026	<0.04	0.2	G	GH
Chlorfenvos	ND	ND	ND	ND	ND			
Chloropyrifos	ND	ND	ND	ND	0.0013	0.03	G	GH
Dichloro	ND	ND	ND	ND	ND			
Diuron	ND	ND	ND	ND	ND			
endosulphan	ND	ND	ND	ND	ND			
floranthene	ND	ND	ND	ND	ND			
hcb	<0.001	<0.001	<0.001	<0.001	ND	0.01	G	GH
hcbd	<0.002	<0.002	<0.002	<0.002	<0.001	0.1	G	GH
hch	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	G	GH
hch_calc	ND	ND	ND	ND	ND			
Hg	0.0187	0.0179	<0.01	ND	<0.01	0.05	G	GH
Indeno	ND	ND	ND	ND	ND			
ISP	ND	ND	ND	ND	ND			
Napthalene	ND	ND	ND	ND	ND			
Ni	0.328	0.318	0.42	0.39	0.45	20	G	GH
Nonyl	ND	ND	ND	ND	ND			
Octyl	ND	ND	ND	ND	ND			
Pb	0.286	0.304	0.123	1.46	0.296	7.2	G	GH
pcp	ND	ND	ND	ND	ND			
simazine	ND	ND	ND	ND	0.001	1	G	GH
TBT	ND	ND	ND	ND	ND			
TCB	ND	ND	ND	ND	ND			
TCB_calc	ND	ND	ND	ND	ND			
trichloromethane	ND	ND	ND	ND	ND			
trifluralin	ND	ND	ND	ND	ND			

<b>G</b>	Good
<b>F</b>	Fail
<b>GH</b>	Good or better and is normally treated as high
<b>M</b>	Moderate

	Mean includes LOD data
	Mean based on actual values

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### ANNEX F: Protected Area Objectives

Water body	Protected area	Designation	Status	Reason for non-compliance
Carlingford Lough	Carlingford Lough	SPA	Favourable	
Carlingford Lough	Carlingford Lough	Saltmarsh	Unfavourable	Vegetation composition - indicators of negative change ( <i>Spartina</i> ). Vegetation composition & structure – too few.
Carlingford Lough	Cassey Water CW4	Shellfish Waters	Compliant. Single sample exceedance in mercury 2004. Not repeated	
Carlingford Lough	Ballyedmond BE1	Shellfish Waters	Compliant. Single sample exceedance in lead 2006. Not repeated.	

### Bathing Water Directive

- Compliance with Guideline standards
- Compliance with Mandatory standards
- Failure to comply with Mandatory standards
- Not on monitoring programme

Water Body		2008	2007	2006	2005	2004	2003
Mourne Coast / Carlingford	Cranfield (Nicholson's)						
Mourne Coast / Carlingford	Cranfield Bay						
Carlingford	Warrenpoint						

### Nitrates Directive

Until 1 January 2007, Northern Ireland had designated seven NVZs on the basis of elevated nitrate levels in groundwaters. These NVZs were very small and covered less than 1% of Northern Ireland's area. However, Northern Ireland also has a widespread problem of eutrophication of surface waters and a large proportion of this nutrient enrichment is attributable to agriculture. Following extensive consultation, the total territory of Northern Ireland was established as the area to which an action programme would be applied under the Protection of Water Against Agricultural Nitrate Pollution Regulations (Northern Ireland) 2004 with effect from 29 October 2004.

### ANNEX G: Alien species (ECOREGION 17 Red List)

*Crassostera gigas* (proposed red list species), *Didemnum* sp., *Spartina anglica* and *Sargassum muticum* are present in the water body.

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**Glossary**

<b>AFBI</b>	Agri-Food and Biosciences Institute (under contract to NIEA)
<b>AMBI</b>	AZTI Marine Biotic Index
<b>Annex 10</b>	Annex 10 Priority Hazardous Substances
<b>Annex 8</b>	Annex 8 Specific Pollutants
<b>Article 5</b>	Characterisation, typology, pressures and impacts analysis
<b>ASSI</b>	Area of Special Scientific Interest
<b>DIN</b>	Dissolved Inorganic Nitrogen
<b>DO</b>	Dissolved Oxygen
<b>EQR</b>	Ecological Quality Ratio
<b>EQS</b>	Ecological Quality Status
<b>EUNIS</b>	European Nature Information System
<b>FSL</b>	Full Species List
<b>GEP</b>	Good Ecological Potential
<b>gH</b>	Good/High status
<b>H/G/M/P/B</b>	High/Good/Moderate/Poor/Bad (Classification Status)
<b>H/M/L</b>	High/Medium/Low (Confidence)
<b>HMWB</b>	Heavily Modified Water Body
<b>IQI</b>	Infaunal Quality Index
<b>IRBD</b>	International River Basin District
<b>LOD</b>	Limit of Detection
<b>MBT</b>	Macroalgal Blooming Tool
<b>MEP</b>	Moderate Ecological Potential
<b>NB</b>	Neagh Bann
<b>ND</b>	No data
<b>NE</b>	North Eastern
<b>NEAGIG</b>	North Eastern Atlantic Geographical Intercalibration Group
<b>NIEA</b>	Northern Ireland Environment Agency
<b>N-regs</b>	Nitrogen Regulation
<b>NVZ</b>	Nitrate Vulnerable Zone
<b>NW</b>	North Western
<b>Physico-chem</b>	Physical and chemical monitoring
<b>RSL</b>	Reduced Species List
<b>SAC</b>	Special Area of Conservation
<b>SEPA</b>	Scottish Environment Protection Agency
<b>SPA</b>	Special Protected Area
<b>TNA</b>	Tool Not Applicable
<b>TraC MImAS</b>	Transitional and Coastal Morphology Impact Assessment System
<b>TUD</b>	Tool Under Development
<b>UKAS</b>	United Kingdom Accreditation Service
<b>UKTAG</b>	United Kingdom Technical Advisory Group for Water Framework Directive
<b>UNICORN</b>	Database for marine organisms.
<b>UWWTD</b>	Urban Waste Water Treatment Directive (91/271/EEC)
<b>VDSI</b>	Vas Deferens Sequence Index
<b>WFD</b>	Water Framework Directive

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Our aim is to protect, conserve and promote  
the natural environment and built heritage for  
the benefit of present and future generations.

[www.ni-environment.gov.uk](http://www.ni-environment.gov.uk)



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