RIVER BASIN MONITORING PLAN

WATER FRAMEWORK DIRECTIVE 1ST CYCLE CLASSIFICATION SUMMARY

2009-2015

Transitional Heavily Modified Water Body – Newry Estuary

31/05/2015

An Agency within the Department of the Environment
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RIVER BASIN MANAGEMENT PLAN		
Department of the Environment www.doeni.gov.uk Marine Environment Division	WFD TRANSITIONAL WATER BODY CLASSIFICATION Newry Estuary	
	Version Date:	31/05/2015
	MONITORING & ASSESSMENT TEAM	

NEWRY RIVER (TRANSITIONAL WATER)

Water body Information

- River Basin District: North Eastern
- Water body type: Transitional Water 2 (TW2)
- Water Body Code: UKGBNI5NB030010
- Water body characteristics: Partly mixed/stratified, mesotidal, sand and mud, mesohaline
- Water body area: 2.56 km^2
- Heavily Modified Water Body: Yes
- 2015 Classification Objective: Moderate Ecological Potential

FINAL CLASSIFICATION	MODERATE ECOLOGICAL POTENTIAL	*PASS/FAIL 2015 OBJECTIVE*	PASS

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WFD TRANSITIONAL WATER BODY CLASSIFICATION
Newry Estuary

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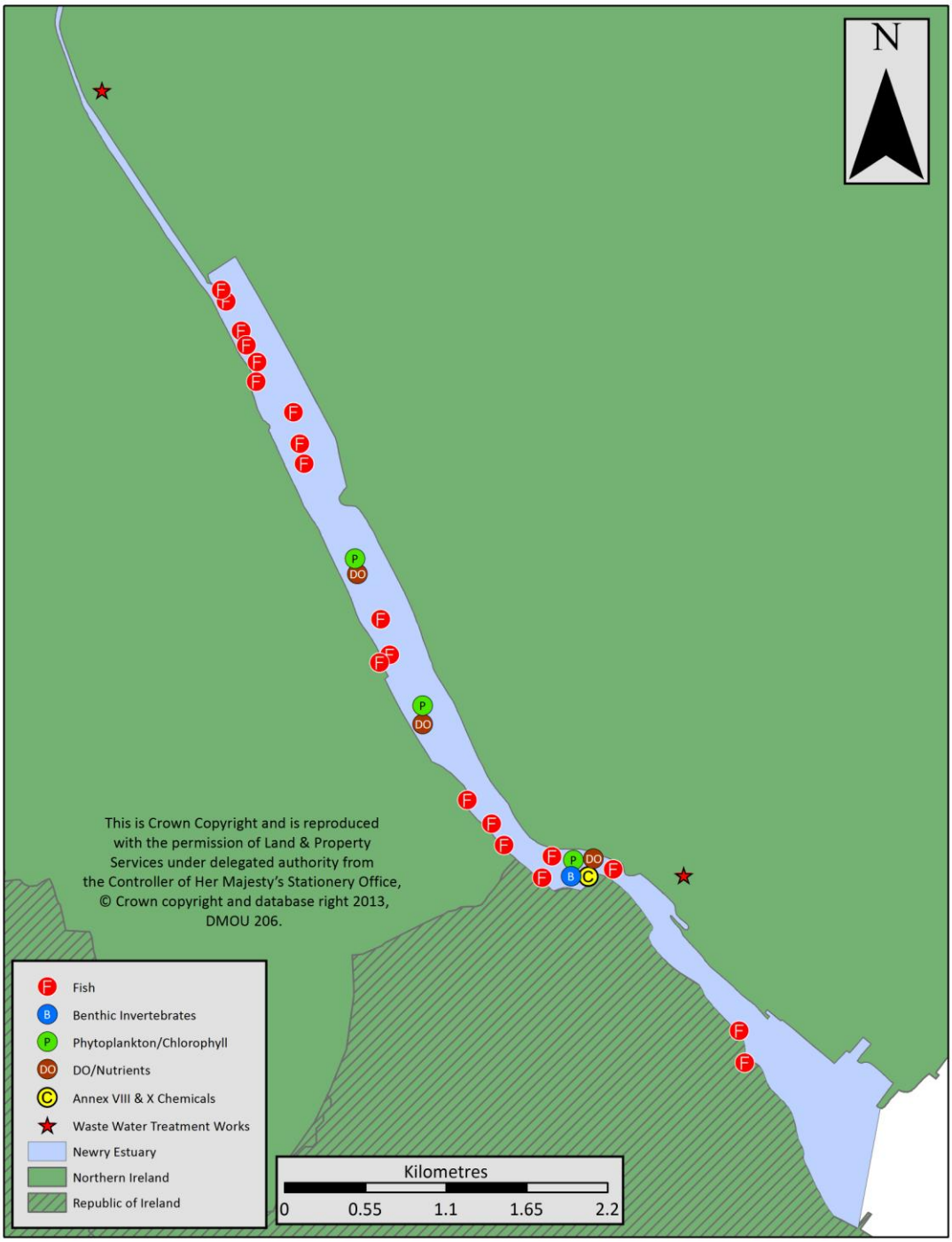

Figure 1: Waste water treatment pressures and monitoring points within Newry Estuary (Transitional Water).

Table 1: Parameters for which classification systems are available and have been used in this 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***
Plants	**Macro Algae**		
	-Opportunistic Macroalgae	✓	
	-Reduced Species List	☒	Tool not applicable
	Angiosperms	☒	Tool not applicable
	Phytoplankton	✓	
Benthic Invertebrates	**Infaunal Quality Index**	☒	Tool under development
	Imposex	☒	Tool not applicable
Fish	**Transitional Fish Classification Index**	✓	
Physico-Chemical	**General Conditions**		
	-*Dissolved Oxygen*	✓	
	-Nutrients	✓	
	Specific Pollutants (Annex VIII subs)	✓	
Hydromorphological Quality Elements	SEPA Rapid Designation	✓	
	TraC MIMAS	✓	
Chemical Status			
Priority Hazardous Substances (Annex X)	Annex X Substances	✓	

Table 2: Sampling frequency for each quality element.

Monitoring Level: *Surveillance*

Quality Elements		Data years contributing to classification	No. of sites/samples
Phytoplankton - 90%ile		2009-2014	3 sites 97 samples
Macroalgae	Macroalgal Blooming Tool	2009	n/a*
Fish	Estuarine Multimetric Fish Index	2014	20 samples
Physio-chemical			
Nutrients		2010-2015	5 sites 59 samples
Dissolved Oxygen		2006, 2008, 2010-2015	
Specific polluting substances (Annex VIII)		2010-2014	
Hydromorphology		2007	
Water chemistry (Annex X)			
Priority hazardous substances		2010-2014	

*Quality element assessed at a whole water body level.

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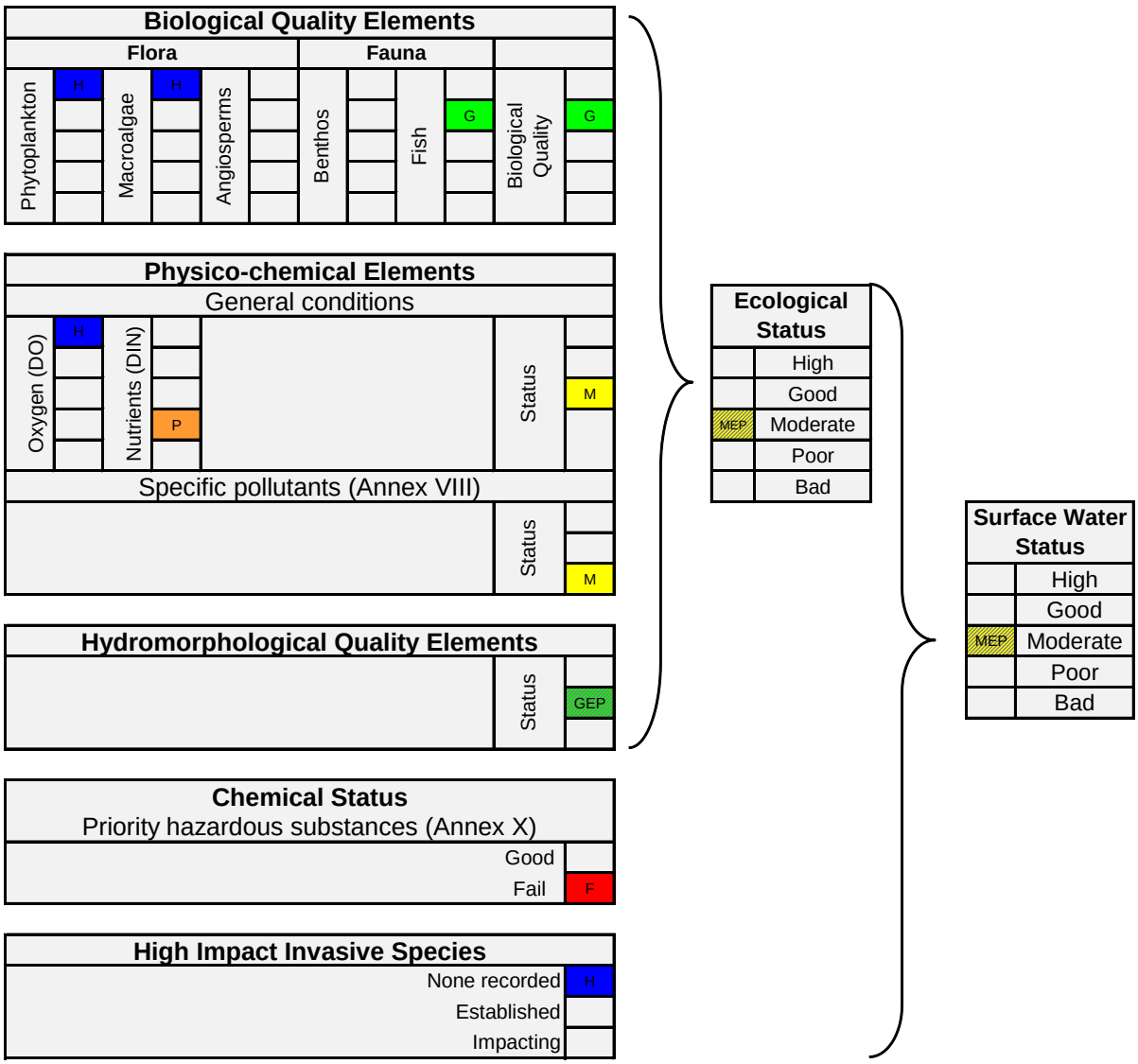

Figure 3: Overall classification of Newry Estuary (Transitional Water).

ANNEX A: Classification of Biological Quality Elements

QE: Phytoplankton

QE phytoplankton assessment (+ Data confidence):	HIGH (97.1%)	

Classification tools:

1. Chlorophyll biomass index (Transitional Waters)
2. Elevated taxa count index –

- **Data store (classification** M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\2015 Elevated Count Classification Update (08-13 data)\Transitionals\NEWRY RIVER_2015 - Copy.XLS
- M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\transitional data\TRANSITIONAL_CHLOROPHYLL newry - Copy.xls

- **Data Availability (spot & continuous samples):**
  Phytoplankton= NA
  Chl = spot (*2007-2012) NIEA*

1. Chlorophyll Biomass Index - TW(Chl μg l^{-1})

Waterbody Chl. biomass assessment **High *(68.6%)***

Thresholds:

Water Ref. Area		Status				
		High	Good	Moderate	Poor	Bad
North/Irish Sea	Chl μg 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:

EQR	Status	Data Years	No. of Sites	No. of Samples	Data Confidence
1.0	HIGH	2009-2014	3	97	68.6%

Data confidence:

Data analysed using CUTLASS V1.8 UKTAG

.

M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\2015TW_Phytoplankton_CofC_tool_CUTLASS_v1.8_UKTAG.xls

2. *Elevated Taxa Count Index*

Thresholds:

Tool	Thresholds	
	North/Irish Sea	Atlantic
I_1 - Individual Species Count%	500,000 (cells l^{-1})	
I_2– Total Taxa Count%	10^6 (cells l^{-1})	

EQR Boundaries:

% exceedances (Face value range)	Metric range (0-1)	Class
0 - <10	≥0.8 - 1.0	High
≥10 - < 20	≥0.6 - < 0.8	Good
≥20 - < 40	≥0.4 - < 0.6	Moderate
≥40 - <60	≥0.2 - < 0.4	Poor
≥60 - 100	≥0 - < 0.2	Bad

Results (% Exceedance):

I_1	I_2	EQR	Status	Data Years	No. of Julian months	No. of phytoplankton samples	Data confidence
14.8 %	3.70%	0.815	High	2011-2014	21	64	60.0%

3. **Combined Chlorophyll and Elevated Count Tool for Waterbody**

High (97.1%)

QE: Macroalgae

QE macroalgal assessment (+ data confidence):	HIGH (L)	

Classification tools:

1. Reduced species list (RSL) Not applicable.
2. Macroalgal Blooming Tool (MBT).

MBT assessment

WFD surveillance monitoring: 2009

- **Data Store:** ..\..\..\..\..\Algae\Fucoid Extent\Trans Waters\Newry River
- **Data Store:** G:\MARINE\Algae\algae images\Macrophytes\Survey Site Images\OGA site photos\Newry River
- **Data Availability:** Visual Inspection

Boundaries:

Parameters	Quality Status	High	Good	Moderate	Poor	Bad
	Sub-metric EQR	***≥0.8 – 1.0***	***≥0.6 – 0.8***	***≥0.4 – 0.6***	***≥0.2 – 0.4***	***0.0 – 0.2***
Available Intertidal Habitat (AIH) %		0 – 5	5 – 15	15 – 25	25 – 75	75 – 100
Affected Area (ha)		0 – 10	10 – 50	50 – 100	100 – 1000	1000 – 2000
Biomass of AIH (g m^2)		0 – 100	100 – 500	500 – 1000	1000 – 3000	3000 - 6000
Biomass of affected area (g m^2)		0 – 100	100 – 500	500 – 1000	1000 – 3000	3000 - 6000
Presence of entrained algae (% of quadrats)		0 – 1	1 – 5	5 – 20	20 – 50	50 – 100

Results:

Year	Sub-metric EQR					Mean EQR	Status
	% cover of AIH	Affected Area	Biomass of AIH	Biomass of affected area	Entrained algae		
2009	<5%						HIGH
					Mean		

Data Confidence: Low

- On classification boundary.
- Visual assessment carried out over intertidal area, if less than 5% cover no further survey required and shore classified as HIGH.
- Intertidal area assessed over two years.
- Satellite imagery or aerial photography may need to be considered to improve data confidence.

Alien taxa: No data

QE Angiosperms: – tool not applicable

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QE: Benthic Invertebrates

QE benthic invertebrate assessment (+ Data confidence):	MODERATE TUD (L)	

Classification tools: 1. Infaunal Quality Index (IQI)

1. IQI (UKTAG v01 20140228)

Water body IQI assessment: **Moderate TUD (Low)**

WFD surveillance monitoring:

- **Data store:** ..\Newry River water body\Newry River water body 08-13 Fauna Data 0_5mm.xlsx
- **Benthic invertebrates** UNICORN (NMMT) Database
- **Supporting Parameters** Water Quality Data Set
- **Digital images** AMAP Project folder
- **Data Availability (classification):** 1 site, 5 reps, 3 years, Day Grab, 0.5 mm sieve, n=15

Boundaries (Intercalibrated NEAGIG):

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

Results:

Year	Survey	Station	n	Annual Mean	Annual ± S.D	Status
2010	MM-Benthos	NR2 (5)	-	-	-	-
2011	MM-Benthos	NR2 (5)	5	0.58	0.03	Moderate
2012	MM-Benthos	NR2 (5)	5	0.52	0.01	Moderate
2013	MM-Benthos	NR2 (5)	5	0.56	0.03	Moderate
2014	MM-Benthos	NR2 (5)	-	-	-	-
2015	MM-Benthos	NR2 (5)	-	-	-	-
Overall 6 year waterbody means			**5**	**0.58(0.56*)**	**0.02**	**Moderate**

TUD – Tool Under development: IQI not signed off for transitional waters
* IQI derived from data averaged minus Standard Deviation (see issues with tools paper). This figure is used for classification

Data confidence: **Low**

- Sample analysis QA'd through NMBAQC (Good)
- Database QA'd (Good)
- No specific WFD data (single point with reps)

QE: Transitional Fish

QE transitional fish assessment (+ Data confidence):	GOOD (70%)	

Classification tools: Transitional Fish Classification Index (TFCI)

Data store:

- **Fish**: ..\..\..\FISH\DATA\WFDClassification\TFCI\TFCI 2014\TFCI 2014 Analysis.xlsx
- **Supporting Parameters**: Chemistry

Data Availability:

- WFD surveillance monitoring 2005-2014; one survey in 2005, two surveys per annum from 2006 to 2011, one (autumn) survey in 2012, 2013 and 2014. Sampling methods include seine net, fyke net, and beam trawl.

EQR boundaries:

	Bad	Poor	Moderate	Good	High
EQR	<0.2	≥0.2; < 0.4	≥0.4; <0.6	≥0.6; < 0.8	≥0.8

Results:
Transitional Fish Classification Index (TFCI) – 2014 data

Metric Number	Metric	Score
1	Species composition	5
2	Presence of Indicator species	2
3	Species relative abundance	4
4	No. of taxa making up 90% of the abundance	4
5	No. of estuarine resident taxa	4
6	No. of estuarine-dependent marine taxa	5
7	Functional guild composition	4
8	No. of benthic invertebrate feeding taxa	3
9	No. of piscivorous taxa	5
10	Feeding guild composition	5
	TFCI	41
	EQR	0.78

Fish cont'd

Percent Confidence of Class (bias corrected bootstrap method)

Bad	Poor	Moderate	Good	High
0.0	0.0	0.2	70.2	29.6

Data confidence: High

- Survey methodologies and protocols (High)
- Realistic type-specific reference conditions (Medium)
- Data QA (High)
- Statistical testing and intercalibration (High)

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

QE: Dissolved Oxygen

QE Dissolved oxygen assessment (+ data confidence):	HIGH (L)	

Classification tools: Comparison of 5% ile against reference standards

- **Data Store:** ..\..\DO Classification 2012\Shortcut to DO FIELD VALUES 2006 -2010.lnk
- **Data Availability:** 2006-2008, 2010-2015
- **Data Source** (spot & continuous samples)**:** Spot

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*)
6.66	HIGH	2006-2008 2010-2015	**		

* Proportion of possible months for which data are available

QE: Nutrients – N regulation

QE N regulation assessment (+ Data confidence):	POOR (91%)	

- **Data store:** ..\Transitional DIN 2015-2021.xls
- **Data Availability:** 2010-2015
  DIN & salinity (Nov to Feb)
- **Data Source (spot & continuous samples):** spot

Thresholds:

Area	Salinity range	DIN (uM) Winter mean H/G	DIN (uM) Winter mean G/M	DIN (uM) Winter mean M/P
Transitional (at salinity 25)	5-25	20-30	30-45	45-67.5

Results:

Mean Winter DIN (uM) (normalised to salinity 25)	Winter DIN Daily average (n)	No. of samples (n)	No. of sites	Data Years	Data Quality	Status
51.16*		59	5	2010-15	Database not yet QA'd	POOR

*Average DIN used as r^2 value of regression model is less than 0.75

ANNEX C: Classification of physico-chemical quality elements: Other specific Pollutants

Specific pollutants assessment (+data confidence)	**MODERATE**	

Classification tools: Comparison with EQS levels.

Data assessed for 2013 Update:

Specific Pollutants

Suite	Parameter	Data Availability
Trace Organics (OPONS)	Dimethoate	FEB 2011 – APR 2011
Trace Organics (OPONS)	Diazinon	FEB 2011 – APR 2011
Trace Organics (OPONS)	Fenitrothion	FEB 2011 – APR 2011
Urea Herbicides	Linuron	OCT 2011 – MAY 2012
Nutrients (Winter Nutrients)	Unionised Ammonia (at pH8)	WIN NUTS 2012-2013
Candidate Specific pollutant	Glyphosate	NOV 2012 – MAR 2013

Other Pollutants – DSD list 2 (with existing EQS)

Suite	Parameter	Data Availability
Trace Organics (OPONS)	Mevinphos	FEB 2011 – APR 2011
Trace Organics (OPONS)	Triazaphos*	FEB 2011 – APR 2011
Trace Organics (OPONS)	Dichlorvos	FEB 2011 – APR 2011

*Triazaphos LOD above the EQS.

*Further data is available but cannot be used for classification until the assessment of Newry and Warrenpoint WWTWs trace organics monitoring data is completed.

Link to Data, Assessment and EQSs
G:\MARINE\Water Framework Directive\WFD ANNUAL CLASSIFCATION UPDATE 2013\Chemistry

Data assessed for 2015 Update:

Specific Pollutants

Suite	Parameter	Data Availability
Trace Organics	Permethrin	June 2013 – June 2014
Trace Organics	Cypermethrin	June 2013 – June 2014
Trace Organics	Toluene	Nov 2013 – Sept 2014
Trace Organics	Xylene	Nov 2013 – Sept 2014

EQS failures

Cypermethrin

Link to Data, Assessment and EQSs
G:\MARINE\Water Framework Directive\WFD ANNUAL CLASSIFICATION UPDATE 2015\2015 QE sheets

ANNEX D: Hydromorphological quality elements

Overall hydromorphology assessment	HMWB-GEP	

Classification tools:

1. TRaC Hydromorphology metrics
2. MIMAS

Alternative approach assessment (CIS guidance 2006): Good Ecological Potential can be achieved based on the hydromorphology assessment.

ANNEX E: Chemical Status – Annex X Chemicals

Priority hazardous substances (+data confidence)	FAIL	

Classification tools: Comparison with EQS levels.

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

Data Assessed for 2013 Update:

Suite	Parameter	Data Availability
Trace Organics (OPONS	Atrazine	Feb 2011 and Apr 2011 only
Trace Organics (OPONS)	Chlorfenvinphos	Feb 2011 and Apr 2011 only
Trace Organics (OPONS)	Chlorpyrifos	Feb 2011 and Apr 2011 only
Trace Organics (OPONS)	Simazine	Feb 2011 and Apr 2011 only
Urea Herbicides	Isoproturon	OCT 2011- MAY 2012
Urea Herbicides	Diuron	OCT 2011- MAY 2012
PAH	Anthracene	Feb 2011 and Apr 2011 only
PAH	Fluoranthene	Feb 2011 and Apr 2011 only
PAH	Naphthalene	Feb 2011 and Apr 2011 only
PAH	Benzo (a) pyrene	Feb 2011 and Apr 2011 only
PAH	*Benzo(b)fluoranthene	Feb 2011 and Apr 2011 only
PAH	*Benzo(k)fluoranthene	Feb 2011 and Apr 2011 only
PAH	*Benzo(g,h,i)perylene	Feb 2011 and Apr 2011 only
PAH	*Indeno(1,2,3 cd) pyrene	Feb 2011 and Apr 2011 only

*AA - EQS = Sum of Benzo(b)fluoranthene and Benzo(k)fluoranthene = 0.03ug/l (No Marine MAC – EQS)

*AA - EQS = Sum of Benzo(g,h,i)perylene and Indeno(1,2,3 cd) pyrene = 0.002ug/l (No Marine MAC – EQS)

EQS Failures:

AA – EQS failure for the sum of Benzo(g,h,i)perylene and Indeno(1,2,3 cd) pyrene.

Measured value = 0.0055 ug/l

There is low confidence as the EQS is an annual average and there is only data available for 1 month (April 2011).

There is no marine maximum allowable concentration (MAC) for comparison.

Further data will be available for classification when the assessment of Newry and Warrenpoint WWTW data is complete.

Link to Data, Assessment and EQSs

G:\MARINE\Water Framework Directive\WFD ANNUAL CLASSIFCATION UPDATE 2013\Chemistry

Data Assessed for 2015 Update:

MARINE PAH INVESTIGATIVE MONITORING 2014

Suite	Parameter	Data Availability
Pesticides	Pentachlorobenzene	April 2014 – Dec 2014
Pesticides	Trifluralin	April 2014 – Dec 2014
Pesticides	HCH	April 2014 – Dec 2014
Pesticides	Hexachlorobenzene	April 2014 – Dec 2014
Pesticides	Alachlor	April 2014 – Dec 2014
Pesticides	Cyclodienes	April 2014 – Dec 2014
Pesticides	Endosuphan	April 2014 – Dec 2014
Pesticides	DDT	April 2014 – Dec 2014
Pesticides	pp DDT	April 2014 – Dec 2014

Suite	Parameter	Data Availability
PAH	Naphthalene	1 sample
PAH	Anthracene	NR
PAH	Fluoranthene	NR
PAH	Benzo(b)fluoranthene	1 sample
PAH	Benzo(k)fluoranthene	1 sample
PAH	Benzo (a) pyrene	1 sample
PAH	*Indeno(1,2,3 cd) pyrene	1 sample
PAH	*Benzo(g,h,i)perylene	1 sample

*AA - EQS = Sum of Benzo(g,h,i)perylene and Indeno(1,2,3 cd) pyrene = 0.002ug/l (No Marine MAC – EQS)

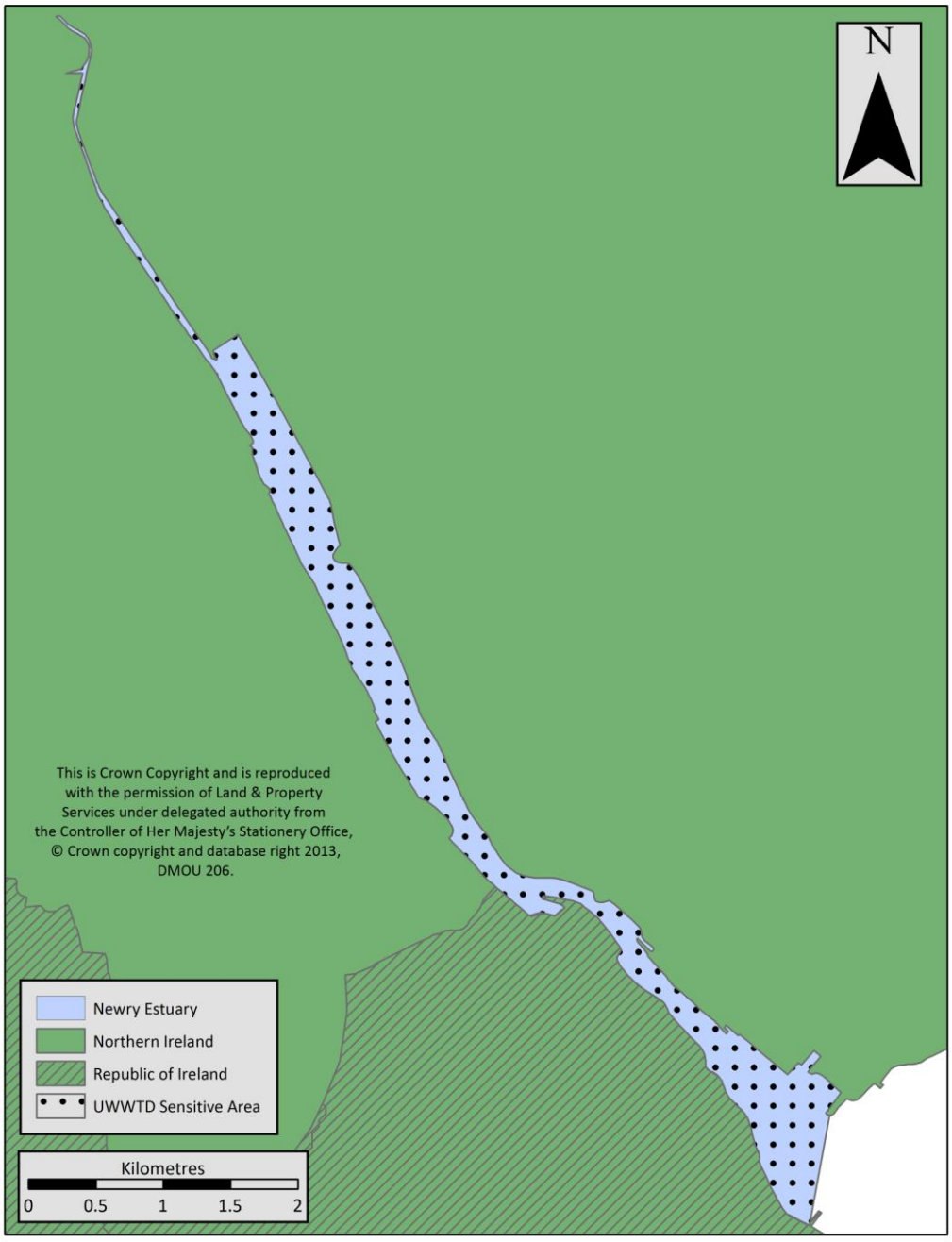
EQS Failure

AA – EQS failure for the sum of Benzo(g,h,i)perylene and Indeno(1,2,3 cd) pyrene.
Calculated result = 0.00249

Link to Data, Assessment and EQSs

G:\MARINE\Water Framework Directive\WFD ANNUAL CLASSIFICATION UPDATE 2015\2015 QE sheets

ANNEX F: Protected Areas



Protected Areas in the Newry Estuary (Transitional Water).

The entire Newry Estuary water body has recently been recommended for designation as an UWWTD sensitive area in the Review of Sensitive Areas in Northern Ireland under the Urban Waste Water Treatment Directive 2008-2013 (May 2015).

ANNEX G: High Impact Invasive Species

QE High Impact Invasive Species assessment		HIGH

Ecoregion 17 Marine High Impact Invasive Species List

Phylum	Species	P	E	I	Record
Chordata	*Didemnum* spp.				
Chordata	*Styela clava*				
Crustacea	*Eriocheir sinensis*				
Mollusca	*Crassostrea gigas*				
Mollusca	*Crepidula fornicata*				
Phaeophyceae	*Sargassum muticum*				
Angiosperms	*Spartina anglica*				

P= Present; E= Established; I= Impacting

NB Established populations of high impact species automatically downgrade overall surface water classification from 'high' to 'good'.

Record should be inputted as follows. PO= personal observation outside of surveys; W= WFD survey; M= museum / institute records.

GLOSSARY

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