Supporting document

Selection of donor river water bodies to be used to classify river water bodies with no monitoring station

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Northern Ireland Environment Agency
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An Agency within the Department of Agriculture, Environment and Rural Affairs
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1. Background

The published Water Framework Directive classification 2009 (WFD2009) included a number of river water bodies that could not be classified using an associated monitoring station. These river water bodies were classified using the results generated by the Pressures and Impacts database.

The document 'Rationale for Water Framework Directive Freshwater Classification'[1] published in December 2009 stated:

Some water bodies with no monitoring stations are not considered appropriate to agglomerate with others for classification. Such situations can arise, for example, for a water body that is a tributary of a larger river where the tributary would not be considered to be under the same pressure(s) as the main river. These water bodies have been classified by pressures and impacts information. Such information was initially gathered and reported for the WFD Article 5 report[2] in 2004 and it contains information on point and diffuse inputs on rivers and has been regularly updated. Thirty eight water bodies have been classified in this way, including a number of cross-border water bodies which have been assessed by consultants under contract to the ROI EPA.

The document 'Surface Water Monitoring and Classification Methodology'[3] published in December 2015 reiterated the process undertaken for WFD2009:

The 2009 Rationale for Water Framework Directive Freshwater Classification document when detailing the WFD classification process (pages 18-23) describes the agglomeration (grouping) of water bodies thus:

Water body with no monitoring station

a) Classified by adjacent water body either upstream or downstream

b) If water body is close to headwaters may be classified by a water body that is more than one 'empty' body away,

c) If agglomeration with others is not considered appropriate, classified from either NI or ROI pressures and impacts information,

[1] https://lakeohridniva.files.wordpress.com/2015/05/classification_freshwater1.pdf
[2] HPRM Reference DO1/08/265900: WFD Summary Report of the Characterisation and Impact Analyses Required by Article 5 - March 2005
[3] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/surface-water-monitoring-and-methodology-for-the-final-river-basin-plans-2015

From the publishing of WFD2009 through the remainder of River Basin Plan 1 (RBP1) the river monitoring network was regularly reviewed[4] and included efforts to reduce the number of the river water bodies classified by pressures and impacts. The reviews covered not only the location of monitoring stations within river water bodies but also the application of agglomeration rules, the designation of the Newry Canal artificial water body and the subsequent re-delineation of river water bodies adjacent to the artificial river water body[5]. The final review of River Basin Plan 1 (RBP1) in 2014 resulted in the re-delineation of the Lough Neagh river water body and included a reduction in the number of the river water bodies from 575 to 450[6].

2. River water bodies classified in WFD2009 using pressures and impacts

Table 1 below shows the fate of the thirty-eight river water bodies in WFD2015 classified by pressures and impacts and published in WFD2009.

WFD2009 River Water body Number	WFD2015 River Water body Number	WFD2015 River Water body Name	Current WFD classification rules
GBNI1NB060604048	GBNI1NB060604048	Newry Canal	Artificial water body
GBNI1NB030306142	GBNI1NB030308238	Derrycaw Stream	Classified by monitoring station
GBNI1NB030301080	GBNI1NB030308233	Clady River	Classified by monitoring station
GBNI1NB030306192	GBNI1NB030308209	Closet River	Classified by monitoring station
GBNI1NB030307032	GBNI1NB030308225	Callan River (Derryscollop)	Classified by monitoring station
GBNI1NB030307037	GBNI1NB030308217	Oona Water (Eglish)	Classified by monitoring station
GBNI1NB030308200	GBNI1NB030308223	River Blackwater (Augher)	Classified by monitoring station
GBNI1NB030304137	GBNI1NB030304137	Ballynargan Stream	Classified by monitoring station
GBNI1NB030303009	GBNI1NB030303009	Black Burn	Classified by monitoring station
GBNI1NB030301070	GBNI1NB030301070	Eden Burn	Classified by monitoring station
GBNI1NB030307047	GBNI1NB030307047	Kilmore Tributary	Classified by monitoring station
GBNI1NB030301219	GBNI1NB030301219	Knockantern Wood Tributary	Classified by monitoring station
GBNI1NB030308119	GBNI1NB030308119	Markethill River	Classified by monitoring station

[4] HPRM Reference: AE2-17-6940: Environmental Protection (DAERA) - Protection - Water - Monitoring (Water) - NIEA - WMU - WADE – Lakes & Rivers – Freshwater Monitoring Reviews

[5] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/introduction-to-identification-and-classification-of-heavily-modified-and-artificial-water-bodies-2009.PDF

[6] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/water-body-boundary-changes-for-the-final-river-basin-plans-2015.pdf

WFD2009 River Water body Number	WFD2015 River Water body Number	WFD2015 River Water body Name	Current WFD classification rules
GBNI1NE040404055	GBNI1NE040405117	Burn Gushet River	Classified by monitoring station
GBNI1NE050503107	GBNI1NE050505127	River Lagan (Lisburn)	Classified by monitoring station
GBNI1NE050504074	GBNI1NE050505115	Quoile River	Classified by monitoring station
GBNI1NW363601077	GBNI1NW363604072	Garvary River	Classified by monitoring station
GBNI1NW363602087	GBNI1NW363604064	Termon River (Pettigoe)	Classified by monitoring station
GBNI1NW363602017	GBNI1NW363602017	Ballina Tributary	Classified by monitoring station
GBNI1NE050503106	GBNI1NE050503106	Brookmount Stream	Classified by monitoring station
GBNI1NB060601020	GBNI1NB060601020	Derryleckagh Stream	Classified by monitoring station
GBNI1NE050503001	GBNI1NE050503001	Hillsborough Park Lake Stream	Classified by monitoring station
GBNI1NE040403064	GBNI1NE040403064	Inver River	Classified by monitoring station
GBNI1NW363602051	GBNI1NW363602051	Kinglass Tributary	Classified by monitoring station
GBNI1NW010103065	GBNI1NW010103065	Owenboy Burn	Classified by monitoring station
GBNI1NW363601032	GBNI1NW363601032	St Angelo Stream	Classified by monitoring station
GBNI1NB030306195	GBNI1NB030308239	Pound River	Classified by pressures and impacts
GBNI1NE050501004	GBNI1NE050501004	Copeland Water	Classified by pressures and impacts
GBNI1NB030306131	GBNI1NB030306131	Doon Stream	Classified by pressures and impacts
GBNI1NE040401044	GBNI1NE040401044	Rathlin Island rivers	Classified by pressures and impacts
GBNI1NB060604051	GBNI1NB060608229	Fane River (Clarebane)	Classified using IE site
GBNI1NB060604050	GBNI1NB060608253	Gentle Owen's Lake Stream (Creaghanroe)	Classified using IE site
GBNI1NB030308105	GBNI1NB030308243	Lough Neagh	Classified using Lough Neagh lake class
GBNI1NW363602035	GBNI1NW363602035	Erne River (Bellanaleck)	Classified using Upper Lough Erne lake class
GBNI1NW363602063	GBNI1NW363602063	Upper Lough Erne	Classified using Upper Lough Erne lake class
GBNI1NW363602098	Not applicable	Not applicable	No longer part of cross border dataset
GBNI1NW363602099	Not applicable	Not applicable	No longer part of cross border dataset
GBNI1NW262601001	GBNI1NW262601001	Shannon River Basin District	Classified by IE

3. Proposals to identify river water bodies with similar typology, risk and proximity (donor river water bodies) as the river water bodies currently without monitoring stations

Four of the thirty-eight river water bodies in the table above have no location suitable for the collection of monitoring data nor can they be agglomerated with another river water body. These are presented in table 2 below.

River Water body Number	River Water body Name	Reason for classifying using Pressures and Impacts
GBNI1NB030308239	Pound River	No access to sampling location
GBNI1NE050501004	Copeland Water	Depleted flow in main channel due to Lough Mourne upstream
GBNI1NB030306131	Doon Stream	No access to sampling location
GBNI1NE040401044	Rathlin Island Rivers	Insufficient resources

Table 2. River water bodies with no location suitable for the collection of monitoring data nor can they be agglomerated with another river water body.

Note: In the first river basin cycle Pound River was classified using the data collected at the monitoring station in the first river basin cycle river water body dataset. The re-delineation of the Lough Neagh river water body resulted in the monitoring station being located inside the Lough Neagh river water body and not the Pound River river water body.

For the first cycle the Environment Protection Agency (EPA) employed a consultant to assign class to river water bodies with no monitoring data. The method extrapolated the WFD Class of a 'donor' river water body using typology, risk and proximity[7]. It is proposed to use a similar method to assign class to the four river water bodies above.

4. Procedure used to identify donor river water bodies

Doon Stream and Pound River

Typology, Altitude and Area were collated for all 450 river water bodies.

Doon Stream and Pound River are both in the Lough Neagh Peripheral catchment and have similar typology, altitude and area as presented in table 3. The main pressure in both the

[7] HPRM Reference AE1/17/654209: FMA - Donor xbrwbs - WFD2009 - F- NS_Status_Obj_Update_12_11_08 - 13nov08 and AE1/17/654206: FMA - Donor xbrwbs - WFD2009 - FW: Splitting Cross Border Water Bodies

river water bodies is agriculture based on the Corine Land Cover[8] inventory ArcGIS dataset available through sde.

River Water body Number	GBNI1NB030306131	GBNI1NB030308239
Location	Doon Stream	Pound River
Dominant geology	Calcareous	Calcareous
Dominant geology (percent)	92.8	99.0
River water body area (km^2)	10.3	12.8
Minimum altitude (m)	12.5	13.5
Maximum altitude (m)	106.8	79.0
Mean altitude (m)	51.4	49.1
UK Typology	Lowland Calcareous Small	Lowland Calcareous Small
Predominant landuse	Pastures	Pastures
Secondary landuse	Complex Cultivation Patterns	Discontinuous Urban Fabric

Table 3. Typology, altitude, area and landuse in the Doon Stream and Pound River water bodies.

With consideration being given in the first instance to proximity, a number of small river water bodies around Lough Neagh were identified as possible donor river water bodies. River water bodies were rejected based on the dominant geology, area and maximum altitude. The predominant land use was assigned as a final additional consideration in the selection process to identify the river water bodies most similar to Doon Stream and Pound River.

Application of the criteria above resulted in a shortlist of three river water bodies which could potentially be used as donor river water bodies for both Doon Stream and Pound River. These are presented in table 4.

River Water body Number	GBNI1NB030304137	GBNI1NB030308209	GBNI1NB030306141
Location	Ballynargan Stream	Closet River	Salterstown River
Catchment	Ballinderry	Lough Neagh Peripherals	Lough Neagh & Peripherals
Dominant geology	Calcareous	Calcareous	Calcareous
Dominant geology (percent)	90.4	98.4	91.1
River water body area (km^2)	12.1	22.3	22.1
Minimum altitude (m)	24.4	12.8	13.8
Maximum altitude (m)	98.7	98.4	140.7

[8] https://www.eea.europa.eu/publications/COR0-landcover

River Water body Number	GBNI1NB030304137	GBNI1NB030308209	GBNI1NB030306141
Mean altitude (m)	45.2	45.0	70.2
UK typology	Lowland Calcareous Small	Lowland Calcareous Small	Lowland Calcareous Small
Predominant land use	Pastures	Pastures	Complex Cultivation Patterns
Secondary land use	Not applicable	Discontinuous Urban Fabric	Pastures

Table 4. Shortlist of three river water bodies which could potentially be used as donor river water bodies for both Doon Stream and Pound River

In WFD2015 the surface water status for the Ballynargan Stream river water body was assessed as Poor with Closet River and Salterstown River river water bodies assessed as Moderate status. Doon Stream and Pound River river water bodies were published as Moderate status using pressures and impacts.

The Pound Burn river water body is very similar to the adjacent Closet River river water body. Table 5 compares the criteria used to identify similar river water bodies.

River Water body Number	GBNI1NB030308239	GBNI1NB030308209
River Water body Name	Pound River	Closet River
Catchment	Lough Neagh Peripherals	Lough Neagh Peripherals
Dominant geology	Calcareous	Calcareous
Dominant geology (percent)	99.0	98.4
River water body area (km^2)	12.8	22.3
Minimum altitude (m)	13.5	12.8
Maximum altitude (m)	79.0	98.4
Mean altitude (m)	49.1	45.0
UK Typology	Lowland Calcareous Small	Lowland Calcareous Small
Predominant land use	Pastures	Pastures
Secondary land use	Discontinuous Urban Fabric	Discontinuous Urban Fabric

Table 5. Comparison of Pound River and Closet River criteria.

The WFD Status of the Closet River river water body donor will be extrapolated to the Pound River river water body.

The Doon Stream river water body is most similar to the Salterstown River river water body.

Table 6 below compares the criteria used to identify similar river water bodies.

River Water body Number	GBNI1NB030306131	GBNI1NB030306141
River Water body Name	Doon Stream	Salterstown River
Catchment	Lough Neagh & Peripherals	Lough Neagh & Peripherals
Dominant geology	Calcareous	Calcareous
Dominant geology (percent)	92.8	91.1
River water body area (km^2)	10.3	22.1
Minimum altitude (m)	12.5	13.8
Maximum altitude (m)	106.8	140.7
Mean altitude (m)	51.4	70.2
UK Typology	Lowland Calcareous Small	Lowland Calcareous Small
Predominant land use	Pastures	Complex Cultivation Patterns
Secondary land use	Complex Cultivation Patterns	Pastures

Table 6. Comparison of Doon Stream and Salterstown River criteria

The WFD Status of the Salterstown River river water body donor will be extrapolated to the Doon Stream river water body.

Copeland Water

The Copeland Water was monitored for chemistry from 1993 to 1997. As a result of the depleted flow in channel, due to Lough Mourne at the top end of the river water body, the monitoring station was closed. The river water body has been assessed as Moderate since WFD2009 using the results from pressures and impacts.

The Copeland Water river water body is heavily modified under the ‘Impoundments for Water Storage and Supply' sector and has been classified under WFD as Bad for hydrology.

For WFD2015 a total of eighteen river water bodies were classified as Bad status for hydrology with twelve heavily modified under the ‘impoundments for water storage and supply’ sector river water bodies classified as Bad status.

The twelve heavily modified river water bodies at Bad hydrology status are presented in table 7 along with the Surface Water Status and Ecological Potential. All were assessed at Moderate Ecological Potential. All river water bodies below except Copeland Water are classified using the results collected from a monitoring station.

River Water body Number	River Water body Name	WFD2015 Surface Water Status	WFD2015 Surface Water Ecological Potential (includes mitigation measures)
GBNI1NE050501004	Copeland Water	MODERATE	MEP
GBNI1NE050501120	Woodburn River	MODERATE	MEP
GBNI1NB030307048	Butter Water	MODERATE	MEP
GBNI1NB030307049	Clay River	MODERATE	MEP
GBNI1NB030308205	Moyola River (Straw)	GOOD	MEP
GBNI1NB030308241	Glenwhirry River	GOOD	MEP
GBNI1NE040403064	Inver River	GOOD	MEP
GBNI1NE050505036	Annalong River	MODERATE	MEP
GBNI1NE050505114	Kilkeel River	POOR	MEP
GBNI1NW010104046	The Black Water (Drumquin)	GOOD	MEP
GBNI1NW010104070	Drumnakilly Burn	MODERATE	MEP
GBNI1NW020202010	Owenrigh River	GOOD	MEP

Table 7. Surface Water status of twelve heavily modified river water bodies at bad hydrology status.

The Woodburn River river water body is adjacent to the Copeland Water river water body. Table 8 compares the criteria used to identify the proposed donor river water bodies. Comparison of typology, altitude and land use show the Woodburn River river water body to be a suitable donor river water body to assess the Copeland Water river water body under WFD.

River Water body Number	GBNI1NE050501004	GBNI1NE050501120
River Water body Name	Copeland Water	Woodburn River
Catchment	Belfast Lough (North)	Belfast Lough (North)
Dominant geology	Calcareous	Calcareous
Dominant geology (percent)	93.9	95.1
River water body area (km^2)	10.4	24.4
Minimum altitude (m)	2.5	2.0
Maximum altitude (m)	286.0	311.5
Mean altitude (m)	178.4	187.8
UK Typology	Lowland Calcareous Small	Lowland Calcareous Small
Predominant land use	Pastures	Pastures
Secondary land use	Coniferous Forest, Discontinuous Urban Fabric	Coniferous Forest, Discontinuous Urban Fabric

Table 8. Comparison of Copeland Water and Woodburn River criteria

Rathlin Island Rivers

Due to resource issues and logistics it has not been possible to initiate a monitoring programme for the Rathlin Island rivers. The river water body has been assessed as Moderate since WFD2009 using the results from pressures and impacts.

A small number of river water bodies have a similar area, typology, mean altitude and pressure from agriculture resulting in an overall WFD status of Moderate or worse. These are presented in table 9.

River Water body Name	WFD21015 Surface Water Status	Catchment	Dominant Geology	Dominant geology (percent)	Total Area km2	Mean altitude (m)	UK Typology
Rathlin Island rivers	MODERATE	NE Coast	Calcareous	86.2	14.4	63.4	Lowland Calcareous Small
Knockantern Wood Tributary	POOR	Lower Bann	Calcareous	84.2	10.8	44.1	Lowland Calcareous Small
Ballinderry River (Coagh)	MODERATE	Ballinderry	Calcareous	88.2	24.6	38.0	Lowland Calcareous Small
Ballynargan Stream	POOR	Ballinderry	Calcareous	90.4	12.1	45.2	Lowland Calcareous Small
Starraghen Tributary	POOR	Upper Erne	Calcareous	77.5	17.9	54.1	Lowland Calcareous Small
Claggan River	MODERATE	Ballinderry	Calcareous	74.6	16.6	86.2	Lowland Calcareous Small
Bush River (Armoy)	MODERATE	Bush	Calcareous	88.5	14.6	89.6	Lowland Calcareous Small
Macosquin River (Milltown)	MODERATE	Lower Bann	Calcareous	89.7	19.0	56.2	Lowland Calcareous Small
Culmore River	MODERATE	Lower Bann	Calcareous	74.8	20.4	93.7	Lowland Calcareous Small
Ramult Burn	MODERATE	Colebrooke	Calcareous	79.2	16.85	103.1	Lowland Calcareous Small
Drumshancorick River	MODERATE	Finn (Fermanagh)	Calcareous	79.0	10.81	116.9	Lowland Calcareous Small
Shinny Water	MODERATE	Lower Bann	Calcareous	77.7	10.23	122.6	Lowland Calcareous Small

Table 9. River water bodies with similar criteria to Rathlin Island Rivers.

A visual assessment of land use using the Corine ArcGIS dataset shows the predominant land use for the Rathlin Island Rivers river water body to be Natural Grasslands followed by Moors and Heathland. None of the river water bodies in table 9 have a similar land use.

It is proposed that WFD assessment of Rathlin Island Rivers river water body could be determined by carrying out a macrophyte survey during the third cycle.

Summary

Table 10 shows how the four river water bodies currently classified under WFD using pressures and impacts will be assessed for the next published WFD classification (WFD2018).

River Water body Number	River Water body Name	Classified by (proposed):	Donor River Water body Number	Donor River Water body Name
GBNI1NB030308239	Pound River	Donor River Water body	GBNI1NB030308209	Closet River
GBNI1NE050501004	Copeland Water	Donor River Water body	GBNI1NE050501120	Woodburn River
GBNI1NB030306131	Doon Stream	Donor River Water body	GBNI1NB030306141	Salterstown River
GBNI1NE040401044	Rathlin Island Rivers	Monitoring Data (survey planned 2018)	Not applicable	Not applicable

Table 10. The donor river water bodies to be used in classifying the river water bodies with no monitoring station.

Appendix I

Pressures and Impacts

Table 1 presents the Pressures and impacts information created for the WFD Article 5 report[9] in 2004 resulted in the following scores:

River Water body Name	Typology	Overall Score
Copeland Water	Type 17: lowland: <200 m, small: 10 to 100 km2, calcareous	1a
Doon Stream	Type 17: lowland: <200 m, small: 10 to 100 km2, calcareous	1b
Rathlin Island Rivers	Type 9: lowland: <200 m, small: 10 to 100 km2, organic	1b
Closet River (Pound Burn)	Type 17: lowland: <200 m, small: 10 to 100 km2, calcareous	1b

The database was revised in 2008[10] and the final overall pressures and impacts scores for the four river water bodies are presented in table 2:

River Water body Name	Overall Score	Due to	Diffuse	Point	Abstraction	Morph	Other	Protected Areas
Copeland Water	1a	Morph	1b	2a	1b	1a	2b	
Doon Stream	1b	Diffuse	1b	2a	2b	2a	2b	
Rathlin Island Rivers	1b	Diffuse /Morph	1b	2a	2a	1b	2b	1b
Closet River (Pound Burn)	1a	Diffuse /Morph	1a	2a	2a	1a	2b	

Table 2. The 2008 revision of overall pressures and impacts scores

Table 3 presents the WFD class assigned to the river water bodies using the Diffuse and Point Pressure scores:

Worst Score	WFD Class
1a	Poor
1b	Moderate
2a	Good
2b	High

[9] HPRM Reference AE1/17/336353: SystemB&RiskCategories-Sep2005
[10] HPRM Reference DO1/12/169830: NIEA - WMU - FMA - Overall P&I Scores Aug08

Table 3. WFD class assigned using the Diffuse and Point Pressure scores

Tables 4 and 5 presents the Pressures and Impacts assessment[11] for freshwater prepared for classification and objective setting for the 2015/2021 River Basin Management Plans:

River Water body Name	Significant Impact Type
Doon Stream	Unknown impact type
Pound Burn	Organic and Nutrient Pollution
Copeland Water	Altered habitats due to hydrological changes
Rathlin Island Rivers	Unknown impact type

Table 4. Significant Impact Type for each of the four river water bodies.

River Water body Name	Significant Pressure Type	Main Driver
Doon Stream	Anthropogenic pressure - Unknown	Not applicable
Pound Burn	Point: IED plants, non-IED plants; Diffuse: discharges not connected to sewerage network	Industry, Urban Development
Copeland Water	Abstraction or flow diversion - Public water supply	Urban Development
Rathlin Island Rivers	Physical alteration of channel/bed/riparian area/shore - Agriculture	Agriculture

Table 5. Significant Pressure Type for each of the four river water bodies

Without monitoring data for the Doon Stream river water body it was not possible to assign significant pressure and impact types information and therefore the information was not used in the selection of donor river water body where risk is a necessary requirement in the decision making process.

The Pound Burn significant pressure and impact types information was based in part on monitoring data collected at a monitoring station in the Lough Neagh river water body which was lake influenced. For this reason the significant pressure and impact types information above has not been used in the selection of a donor river water body to assign WFD status to Pound Burn as it refers to the RBP1 monitoring station and river water body.

Without monitoring data for the Copeland Water river water body it was not possible to assign significant pressure and impact types information relating to nutrient pressures or impacts. This means the information could not be used in the selection of donor river water body where risk is a necessary requirement in the decision making process.

[11] DO1/16/101324 : Pressures and Impacts assessment for freshwater

The significant pressure in Rathlin Island Rivers river water body has been recorded as physical alteration and agriculture with the significant impact recorded as unknown. For this reason the significant pressure and impact types have not been used in the selection of a donor river water body where risk is a necessary requirement in the decision making process.

Northern Ireland Environment Agency
www.daera-ni.gov.uk

For further information:

Integrated Catchment Planning Team
NIEA Water Management Unit
17 Antrim Road, Tonagh, Lisburn Co. Antrim
BT28 3AL

Tel: 028 9263 3481
Email: catchmentplanning@daera-ni.gov.uk
www.daera-ni.gov.uk

An Agency within the Department of Agriculture, Environment and Rural Affairs
www.daera-ni.gov.uk

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