Report on the Interim Classification of Ecological Potential and Identification of Measures for Ireland's Artificial Water Bodies (AWBs)

DRAFT

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For
The Surface Water Status Group

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1.0 INTRODUCTION

The purpose of the Water Framework Directive (WFD) which came into force in 2000 is to establish a framework for the protection of all waters, including canals. Canals are classified as Artificial Water Bodies (AWBs) under the WFD and have been reported as such in March 2005 under Article 5 of the Directive. AWBs are defined in Article 1 of the WFD as "*a body of water created by human activity*".

The WFD sets out the objective of protecting and enhancing all AWBs to achieve Good Ecological Potential (GEP) by 2015. The ecological potential of a water body represents the degree to which the quality of the water body's aquatic ecosystem approaches the maximum it could achieve, given the artificial characteristics of the water body that are necessary for its use (U.K. TAG 2008).

This report outlines the process undertaken to classify the ecological potential of those AWBs owned and/or monitored by Waterways Ireland. This information will facilitate the completion of the draft River Basin Management Plans.

2.0 IDENTIFICATION OF AWBS

Thirty-six canal water bodies and two reservoirs were identified as AWBs during the Characterisation and Analysis of Ireland's RBDs under Article 5 of the Directive. A basic typology was applied for canals based on:

1. Summit points (the canals equivalent of a catchment divide) and
2. Major canal junctions (equivalent to a confluence).

Each canal was subdivided further based on RBD boundaries, even though these do not influence the ecological potential of canals, to allow for discrete water body reporting by each RBD to the European Commission. Table 1 outlines those canals which are owned and/or monitored by Waterways Ireland and their WFD ID code. Figure 1 illustrates particular sections of canal that are located in each RBD.

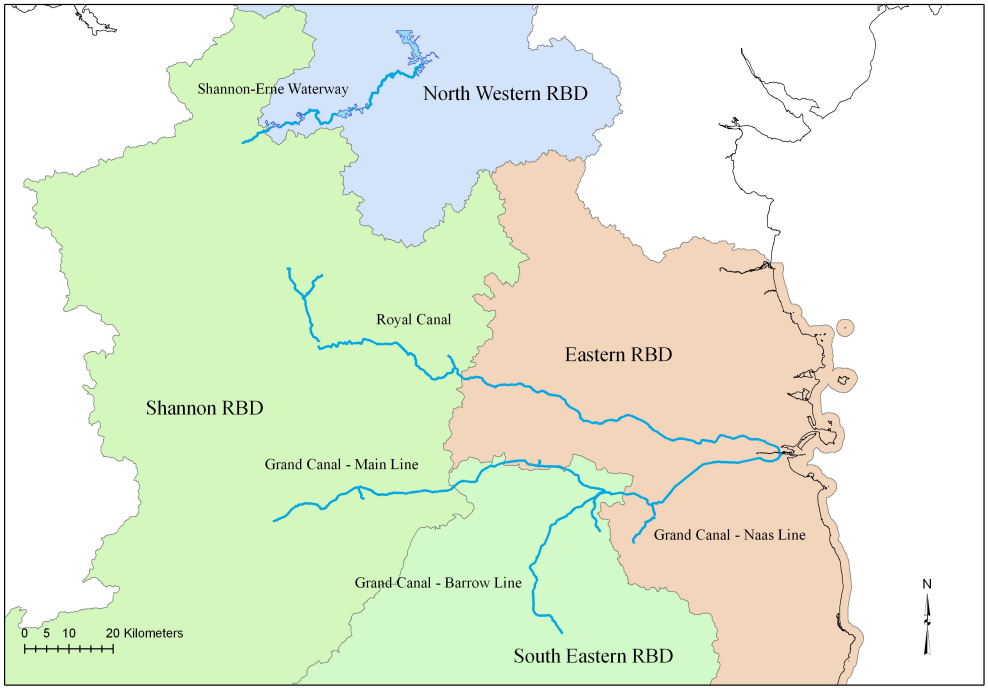

Figure 1: Distribution of Canal AWBs among RBDs

RBD	ID_CODE	AWB Monitored/Owned By Waterways Ireland	Length (km)
ROYAL CANAL			
EA	IE_EA_pAWB_RCML	Royal Canal Main Line (ERBD)	82.8
SH	IE_SH_pAWB_RCMLE	Royal Canal Main Line (ShRBD) East of Lough Owel	2.9
SH	IE_SH_pAWB_RCMLW	Royal Canal Main Line (ShRBD) West of Lough Owel	41.7
SH	IE_SH_pAWB_RCLOF	Royal Canal Lough Owel Feeder	3.6
SH	IE_SH_pAWB_RCLB	Royal Canal Longford Branch	1.2
GRAND CANAL			
EA	IE_EA_pAWB_GCMLE	Grand Canal Main Line (ERBD) East of Lowtown	41.4
SE	IE_SE_pAWB_GCMLE	Grand Canal Main Line (SERBD) East of Lowtown	4.2
SE	IE_SE_pAWB_GCMLW	Grand Canal Main Line (SERBD) West of Lowtown	25
EA	IE_EA_pAWB_GCMLW	Grand Canal Main Line (ERBD) West of Lowtown	14.6
SH	IE_SH_pAWB_GCML	Grand Canal Main Line (ShRBD)	46.5
EA	IE_EA_pAWB_GCNCB	Grand Canal Naas & Corbally Branch	12.1
EA	IE_EA_pAWB_GCEB	Grand Canal Edenderry Branch	1.6
EA	IE_EA_pAWB_GCB	Grand Canal Basin	
BARROW LINE			
SE	IE_SE_pAWB_GCMFOBL	Grand Canal Milltown Feeder & Old Barrow Line	11.7
SE	IE_SE_pAWB_GCBL	Grand Canal Barrow Line	46
SE	IE_SE_pAWB_BWN	Barrow Navigation (15 canal cuts)	15.1
SHANNON-ERNE			
NW	IE_NW_pAWB_SEW	Shannon - Erne Waterway (NWRBD)	2.1
SH	IE_SH_pAWB_SEW	Shannon Erne Waterway (ShRBD)	6.3
SHANNON NAVIGATION			
SH	IE_SH_pAWB_SHN	Shannon Navigation (6 canal cuts)	12.9
SH	IE_SH_pAWB_ALC	Allen Canal	7.1
SH	IE_SH_pAWB_BYC	Boyle Canal	1.2
SH	IE_SH_pAWB_CDC	Cloondara Canal	0.7
SH		Athlone Canal	2.25
SH	IE_SH_pAWB_BSC	Ballinasloe Canal	1.3
SH	IE_SH_pAWB_EPC	Errina - Plassey Canal	9.3
ULSTER CANAL			
NB	IE_NB_pAWB_USC	Ulster Canal	7.7

Table 1: AWBs owned and/or monitored by Waterways Ireland

3.0 ECOLOGICAL CLASSIFICATION

Good Ecological Potential (GEP) and Maximum Ecological Potential (MEP, as reference condition) have yet to be defined for AWBs.

A prototype canal classification tool to assess the status of UK and Irish canals under WFD is being developed under an existing research project driven by the Scottish and Northern Ireland Forum for Environmental Research (SNIFFER research project WFD61). The EPA and Waterways Ireland are co-funding this project along with British Waterways, the Scottish EPA and the UK Environment Agency. The tool, in its current form, can use macroinvertebrate, macrophyte, hydromorphological and physicochemical data to classify the ecological potential of a canal. However, it is based on data largely derived from England and Wales and thus requires refining using data collected from Scotland and Ireland. The next phase of this project is to complete the development of this tool, thus enabling the classification of canals in the UK and Ireland in line with the requirements of the WFD.

In the absence of this tool, interim classification of ecological potential for AWBs in Ireland was undertaken using a combination of water chemistry data, biological data and the UK Technical Advisory Group's (UKTAG) guidance on hydromorphological assessment. These are discussed below.

3.1 Physico-Chemical Parameters

To determine the ecological potential of AWBs water chemistry was assessed using 2006 – 2007 data from the canal monitoring programme for the WFD. This consists of 40 monitoring sites throughout the canals in Ireland across four RBDs. Figure 2 outlines the location of these monitoring sites across the country.

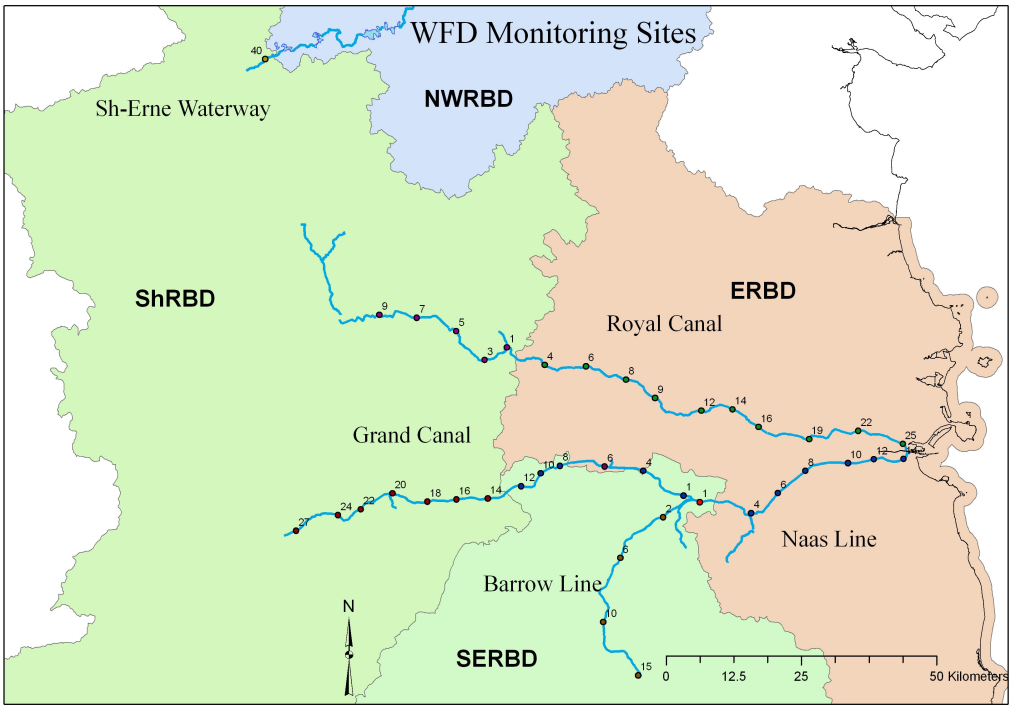

Figure 2: Distribution of monitoring points throughout Canal AWBs

Canal monitoring is currently carried out by the Central Fisheries Board (CFB) on behalf of Waterways Ireland (WI) for their maintenance programme. CFB has undertaken this work for almost two decades. The EPA reports on the water quality of canals in Ireland are based on CFB monitoring data.

Table 2 outlines the threshold values used for assessing the physico-chemical elements in determining ecological potential and their various sources. The value for MRP was assigned based on expert judgement from CFB. Values for ammonia and BOD were assigned based on the SNIFFER research project WFD61. Values for dissolved oxygen, and total and faecal coliforms were assigned based on existing regulatory limits.

Water chemistry data for each canal is included in Appendix A.

Water Quality Parameters		
Parameter	**Threshold**	**Source**
MRP mg/l	≤ 0.02	Central Fisheries Board - Expert Judgment
Ammonia mg/l	≤ 0.12	SNIFFER WFD61
B.O.D. mg/l O_2	< 2.5	
DO mg/l	≥ 5	Fresh Water Fish Directive
Total Coliforms CFU/100ml	≤ 5,000	Bathing Water Directive
Faecal Coliforms CFU/100ml	≤ 1,000	Bathing Water Directive

Table 2: Threshold values used for assessing the physico-chemical elements

3.2 Biological Parameters

3.2.1 Benthic Macroinvertebrates: ASPT (Average Score Per Taxon)

In assigning the ecological potential of AWBs, the metric ASPT (Average Score Per Taxon) was used to assess benthic macroinvertebrates. This is a commonly used method for assessing water quality based on invertebrate sensitivity to pollution, particularly organic pollution.

Initially, this involves calculating the BMWP (Biological Monitoring Working Party) biotic score for each site. This method:

1. Assigns a score of 1–10 for each taxon, with the more pollution sensitive taxa being allocated higher scores and the more pollution tolerant taxa lower scores.
2. The BMWP score for each site is calculated by summing the individual taxon scores.
3. The ASPT is then calculated by dividing the BMWP score by the total number of BMWP taxa present at the site.

ASPT values range from 0–10, with higher values representing good water quality. In the present assessment, the ASPT for each AWB was assigned by calculating the average ASPT value for all sites in that water body.
In the development of a classification tool for Irish and UK canals (WFD61), an ASPT value of ≥ 4.5 was used to identify reference sites. For the purposes of this preliminary classification of

AWBs, and in the absence of any specific guidelines, an ASPT value of ≥ 4.5 is cited as representing GEP. Data on benthic macroinvertebrates and ASPT values for each canal is included in Appendix A.

3.2.2 Macrophytes

While 2006 – 2007 data on macrophytes was collected throughout the canals, it is difficult to assess these data in terms of their contribution to GEP because of the artificial nature of the canal systems.

The aim of the SNIFFER research project (WFD61) is to refine a tool for canals which will incorporate an assessment of macrophyte data for canals.

Waterways Ireland has also commissioned the development of a macrophyte and macroinvertebrate Ecological Quality Ratio (EQR) to aid in establishing the current ecological status of Irish canals under the WFD. The EQR will be based on two biological quality elements: macrophytes and macroinvertebrates. A detailed review of all existing classification tools, in particular the SNIFFER WFD61 tool, will be conducted and used to inform the development of the EQR.

In the absence of a specific tool to assess this biological quality element these data were ignored when assigning ecological potential for AWBs at this interim stage.

3.3 Hydromorphological Assessment

The UKTAG's 2008 document *Guidance on the Classification of Ecological Potential for Heavily Modified Water Bodies and Artificial Water Bodies* provides guidance on the process of classifying the ecological potential of HMWBs and AWBs. The guidance sets out a method for identifying whether a HMWB or AWB meets its ecological potential or not by:

- Identifying the mitigation measures necessary to ensure the hydromorphological characteristics of a water body are consistent with good or maximum ecological potential and
- Assessing whether those measures have been taken.

The method set out in this guidance is based on the use of generic checklists. The process of classifying ecological potential is based on an assessment of whether measures included in the checklists have been taken to mitigate the modified or artificial hydromorphological characteristics of the water body. The hydromorphological characteristics of a water body will support the achievement of GEP, or better, where all mitigation measures on the relevant checklists have been taken except for those which:

- Are not practicable given the characteristics of the water body;
- Have a significant adverse impact upon the use; and
- Have a significant adverse impact on the wider environment.

Where all measures are in place, the water body will be defined as achieving GEP. Where measures are not in place the water body will be defined as Moderate Ecological Potential or worse (UKTAG, 2008).

Waterways Ireland and CFB participated in a research project driven by the Association of Inland Navigation Authorities (AINA) to develop the relevant mitigation measures for the inland navigation sector in relation to defining GEP. AINA were invited by UKTAG to carry out the work according to their specification template. To assign status for the canals in Ireland checklists were completed for each AWB. These are included in Appendix B and outline mitigation measures for potential impacts. The results of this process are summarized in Appendix A.

3.4 Confidence

Expert judgement was used in the overall assessment of the status of the canals. In the absence of a multimetric index for assigning GEP, it was not possible to determine statistical confidence at the present time.

4.0 INTERIM CLASSIFICATION OF ECOLOGICAL POTENTIAL

The interim classification of ecological potential for each AWB is outlined in Table 3. Appendix A summarises the data on which these determinations were based and comments on the driving factors for each canal and on any anomalies.

As indicated in Table 3, most canals have been determined to be at GEP. In three cases the status has been determined to be at GEP by extrapolation. In these cases the canal did not have a WFD monitoring site. However, based on historic water chemistry data, the mitigation measures assessment and the hydrological connectivity with canals deemed to be at GEP, status was assigned.

In the case of the Shannon Navigation and the Barrow Navigation, these were assigned interim status by the nearest River Water body status. The rationale being that if the status of the nearest river water body was less than good than a less than GEP was applied to that particular canal.

Waterways Ireland and CFB will reassess the coverage of the WFD canal monitoring programme in light of the results of the assessment of ecological potential.

The main line of the Royal Canal, west of Lough Owel, was determined to have a status less than GEP because it is currently being restored and consequently is dewatered in sections. The Grand Canal Basin was determined to have poor ecological potential due to poor water chemistry data.

The status of several canals and canal cuts that fall within the water bodies of the River Shannon and the River Barrow were assigned based on the status of these rivers.

RBD	AWB MONITORED/OWNED BY WATERWAYS IRELAND	Interim Ecological Potential
	ROYAL CANAL	
EA	Royal Canal Main Line (ERBD)	GEP
SH	Royal Canal Main Line (ShRBD) East of Lough Owel	GEP by Extrapolation
SH	Royal Canal Main Line (ShRBD) West of Lough Owel	Less than GEP. Section Under Restoration.
SH	Royal Canal Lough Owel Feeder	GEP by Extrapolation
SH	Royal Canal Longford Branch	Non-functional
	GRAND CANAL	
EA	Grand Canal Main Line (ERBD) East of Lowtown	GEP
SE	Grand Canal Main Line (SERBD) East of Lowtown	GEP
SE	Grand Canal Main Line (SERBD) West of Lowtown	GEP
EA	Grand Canal Main Line (ERBD) West of Lowtown	GEP
SH	Grand Canal Main Line (ShRBD)	GEP
EA	Grand Canal Naas & Corbally Branch	GEP
EA	Grand Canal Edenderry Branch	GEP by Extrapolation
EA	Grand Canal Basin	Poor
	BARROW LINE	
SE	Grand Canal Milltown Feeder & Old Barrow Line	GEP
SE	Grand Canal Barrow Line	GEP
SE	Barrow Navigation (15 canal cuts)	Less than GEP Assigned based on River Barrow
	SHANNON-ERNE	
NW	Shannon Erne Waterway (NWRBD)	GEP
SH	Shannon Erne Waterway (ShRBD)	GEP
	SHANNON NAVIGATION	
SH	Shannon Navigation (6 canal cuts)	Less than GEP. Assigned based on River Shannon
SH	Allen Canal	GEP. Assigned based on River Shannon
SH	Boyle Canal	Less than GEP. Assigned based on River Shannon
SH	Cloondara Canal	Less than GEP. Assigned based on River Shannon
SH	Athlone Canal	Non-functional
SH	Ballinasloe Canal	Less than GEP. Assigned based on River Shannon
SH	Errina - Plassey Canal	Non-functional
	ULSTER CANAL	
NB	Ulster Canal	Non-functional

Table 3: Interim classification of ecological potential of Waterways Ireland Canals

Non Waterways Ireland Canals

There are also 10 canals which are not owned or monitored by Waterways Ireland. The classification of these 10 canals has not been determined for this interim status stage. There was no monitoring available for these canals and it was decided that expert opinion could not determine the Ecological potential of these canals at this stage.

These canals are given in Table 4 below.

Table 4: Interim Status Classification of Non- Waterways Ireland Canals

No	RBD	ID_CODE	AWB NAME	Length Km	Ecological Potential
1	SH	IE_SH_AWB_TSC	Tralee Ship Canal	2.87 Km	To be determined
2	SH	IE_SH_AWB_ATR	Ardnacrusha_Tailrace	1.93 Km	To be determined
3	SH	IE_SH_AWB_AHR	Ardnacrusha_Headrace	11.65 Km	To be determined
4	SE	IE_SE_AWB_CHC	Cahore Canal	4.94 Km	To be determined
5	SE	IE_SE_AWB_CBC	Castlebridge Canal	1.09 Km	To be determined
6	EA	IE_EA_AWB_BYN	Boyne Navigation	16.13 Km	To be determined
7	WE	IE_WE_AWB_CNC	Cong Canal	6.54 Km	To be determined
8	WE	IE_WE_AWB_EGC	Eglington Canal	1.33 Km	To be determined
9	SW	IE_SW_AWB_LMC	Lismore Canal	2.26 Km	To be determined
10	NW	IE_NW_AWB_CDH	Clady Headrace	2.67 Km	To be determined

Reservoirs

There are also two reservoirs which have been designated as AWB. These are not owned or monitored by Waterways Ireland. These two reservoirs are as follows:

- Turlough Hill (ERBD)
- Ballynafagh Reservoir (SERBD)

Turlough Hill Reservoir was created at the summit of Turlough Hill in the Wicklow Mountains to serve as a storage reservoir for the ESB hydroelectric power station. It measures 0.14km2 in area. No monitoring data were available in order to identify if the reservoir currently meets its equivalent potential standard. This AWB has been designated as GEP by exert opinion.

Ballynafagh Reservoir: Ballynafagh Reservoir (known as Ballynafagh Lake) is located 3.3km north of the Grand Canal, close to Prosperous, Co. Kildare. It was constructed during the 1780's as a water supply reservoir for the Grand Canal by excavating and embanking the area to create the lake. It is no longer connected to the Grand Canal; its use as a recreation and amenity resource prevail. It is of high ecological value and has been designated as a candidate SAC It measures 4.6 hectares in area. No monitoring data were available in order to identify if the reservoir currently meets its equivalent potential standard. The Ecological Potential of this reservoir has yet to be determined.

Table 5 below details the interim status classification of the two reservoirs.

Table 5: Interim Status Classification of Reservoirs.

No	RBD	ID_CODE	AWB NAME	Area Km²	Ecological Potential
1	SE	IE_SE_AWB_BR	Ballynafagh Reservoir	0.14	GEP
2	EA	IE_EA_AWB_THR	Turlough Hill Reservoir	0.046	To be determined

Appendix A

Appendix B