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SCOTTISH GOVERNMENT

The river basin management plan for the Scotland river basin district 2009–2015

Chapter 4:
Heavily modified and artificial water bodies

Chapter guide*

*Appendices for this document are available on the SEPA website at: www.sepa.org.uk/water/river_basin_planning.aspx

1. Introduction

This chapter summarises:

- the process used to designate water bodies as heavily modified or artificial;
- SEPA's assessment of the condition of these water bodies;
- the environmental objectives that we have set for them.

Some surface water bodies have been substantially altered in character for purposes such as navigation, power generation, public water supply provision, recreation, land drainage and other important human sustainable development activities.

The alterations to the water bodies' physical characteristics may have been caused by:

- direct engineering modifications to the structure and condition of the bodies' beds, banks and shores - or morphological characteristics - (eg engineered concrete flood defence walls, etc);
- substantial changes to water flows and levels (eg the disruption of water flows and levels caused by large dams) that have consequent impacts on the structure and condition of the beds, banks and shores of water bodies.

Where their physical characteristics cannot be restored without significant adverse impacts on the uses served by the alterations or on the wider environment, SEPA has identified the water bodies for designation as heavily modified.

The ecological quality of heavily modified water bodies (HMWBs) is described by their "ecological potential". This is a measure of how the ecological quality of such a water body compares with the maximum quality achievable without significant adverse impacts on:

- the purposes served by the physical alterations (eg flood defence or hydropower generation);
- the wider environment.

The ecological potential of a HMWB may be maximum, good, moderate, poor or bad (see Section 3).

Water bodies have been designated as artificial water bodies (AWBs) if they were created where no water body previously existed (eg most canals and some reservoirs). As for HMWBs, the ecological quality of artifical water bodies (AWB)s is described by their ecological potential.

Except where so doing is technically infeasible or disproportionately expensive, the objective for a HMWB or AWB that is not at maximum or good ecological potential is to achieve good ecological potential by 2015. Longer timescales, for example by 2021 or 2027, may be set if improvement is possible but it is technically infeasible or disproportionately expensive to do by 2015.

2. Designation of heavily modified or artificial water bodies

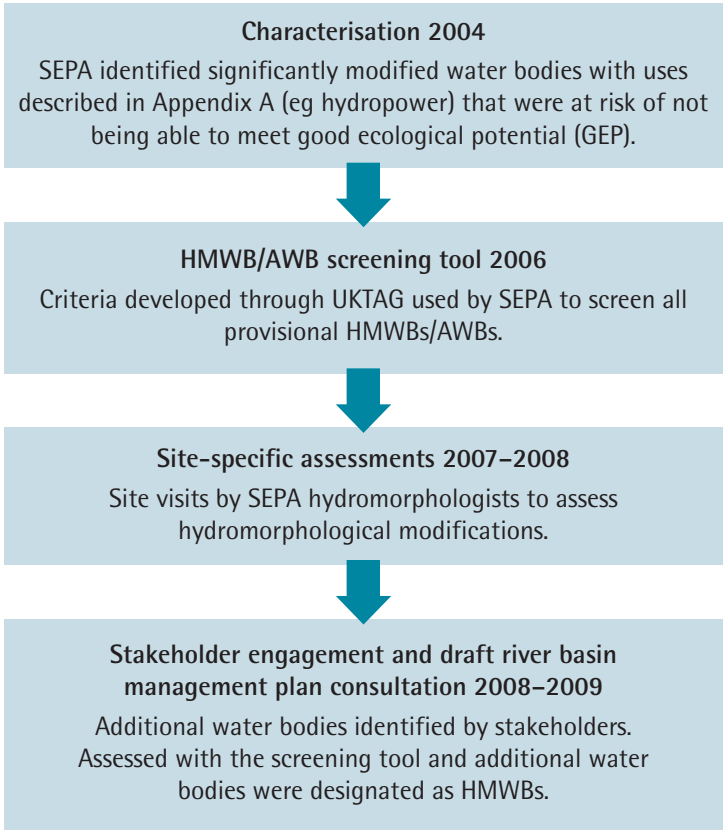
To identify water bodies for designation as HMWBs and AWBs, SEPA has followed the general approach to designating such water bodies set out in European guidance[1]. Information on the conditions required for designation and the criteria used by SEPA to assess whether those conditions are met can be found in Appendix A. Figure 1 below outlines the designation process.

As part of the initial characterisation of the Scotland RBD, which was completed in 2004[2], SEPA identified a number of water bodies as provisional HMWBs or AWBs. These water bodies were screened to identify those that clearly met the conditions for designation as HMWBs or AWBs. The method used to do this followed guidance[3] issued by the UK Technical Advisory Group (UKTAG).[4]

Additional HMWBs have subsequently been identified by SEPA as it has gathered further information on the status of bodies of surface water and the pressures on them.

Summary information on all water bodies that have been designated as HMWBs or AWBs is given in Tables 1 and 2 below. If you want information about a particular water body, please use the interactive map on SEPA's website at: www.sepa.org.uk/water/river_basin_planning.aspx

Figure 1: Designation process for HMWBs and AWBs in the Scotland River Basin District



[1] www.wfduk.org
[2] www.sepa.org.uk/water/water_publications/characterisation_reports.aspx
[3] Information on the principles used is given at www.wfduk.org/tag_guidance/article_4/heavily_modified_wb
[4] The UKTAG on the Water Framework Directive was established by the UK government administrations with representatives from SEPA, Environment Agency, Environment and Heritage Service for Northern Ireland, Scottish Natural Heritage, Natural England, Countryside Council for Wales and the Department for the Environment and Local Government in the Republic of Ireland.

Table 1: Number of HMWBs/AWBs in the Scotland RBD

Purpose for which water body designated		Number of water bodies				
		River	Loch	Estuary	Coastal	Artificial
Navigation	Inland waterways such as canals	2	3	0	0	26
	Ports and harbours	0	0	3	1	0
Water storage	Drinking water supply	43	37	0	0	0
	Power generation	165	53	0	0	0
Land drainage	Agriculture	15	0	0	0	2
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	45	1	6	3	0
Protection of wider environment	Biodiversity	18	14	0	0	0
	Built heritage	1	0	0	0	12
Total		**289**	**108**	**9**	**4**	**40**
Total number of unique water bodies		**267**	**96**	**6**	**4**	**40**

Note:
Some water bodies are identified as heavily modified water bodies for more than one purpose and are consequently counted more than once in Table 1.

Table 2: Length/area of heavily modified and artificial water bodies in the Scotland RBD

Purpose for which water body designated		River (km)	Loch (km^2)	Estuary (km^2)	Coastal (km^2)	Artificial	
						Length (km)	Area (km^2)
Navigation	Inland waterways such as canals	27	20	0	0	167	0
	Ports and harbours	0	0	5	46	0	0
Water storage	Drinking water supply	380	80	0	0	0	0
	Power generation	1738	280	0	0	0	0
Land drainage	Agriculture	157	0	0	0	15	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	452	1	53	53	0	0
Protection of wider environment	Biodiversity	126	31	0	0	0	0
	Built heritage	14	0	0	0	5	1
Total		**2893**	**410**	**59**	**99**	**187**	**1**
Total length/area of unique water bodies		**2722.9**	**356**	**53**	**99**	**124**	**1**

Note:
Some water bodies are identified as heavily modified water bodies for more than one purpose and are consequently counted more than once in Table 1.

3. Classification of heavily modified and artificial water bodies

The process used by SEPA to assess the ecological potential of heavily modified and artificial water bodies is set out in the Scotland River Basin District (Classification of Water Bodies) Directions 2009[5].

The process is based on the methodology recommended by UKTAG[6] and described in guidance prepared under the Common Implementation Strategy for the Water Framework Directive[7].

The detailed criteria used by SEPA to enable the classification of large numbers of HMWBs and AWBs to be completed for inclusion in this plan are set out in the UKTAG methodology or in Table A1 in Appendix A available on the SEPA website at: www.sepa.org.uk/water/river_basin_planning.aspx

Information on the extent to which the impacts of water bodies' heavily modified or artificial characteristics have been mitigated was provided by water users and other interested parties at a series of workshops organised by SEPA. This process is described in Annex 2: Consultation and engagement, available online at: www.sepa.org.uk/water/river_basin_planning.aspx

As further information is gathered about the water bodies concerned, understanding of the ecological potential they can achieve will improve. Such improvements in understanding will be taken into account in future updates of this plan.

To classify the ecological potential of a HMWB or AWB, SEPA has assessed:

- whether or not all practicable improvements have been made to the physical characteristics of HMWBs and AWBs;
- the impacts of other pressures – including pollution pressures on the ecological quality of the water body. To do this, it has applied the same environmental standards used in classifying the ecological status of similar unmodified water bodies (see Chapter 1 available on the SEPA website at: www.sepa.org.uk/water/river_basin_planning.aspx

For example, alterations to a HMWB's physical characteristics may have been sufficiently mitigated to be able to support the achievement of good ecological potential. However, if the water body's water quality is poor as a result of pollution (eg nutrient enrichment), its overall ecological potential will be classified as poor.

Table 3: Classification status classes for heavily modified and artificial water bodies

Ecological potential class	Basis of classification
Maximum	All practicable mitigation measures are in place to ensure the water body's physical characteristics are maintained in as good a condition as possible without significantly impacting on a designated use (eg hydropower generation) or the wider environment Water quality is high. Other pressures are having no more than a very minor impact.
Good	All practicable mitigation measures, other than those expected to cumulatively provide only very minor ecological benefit, are in place to ensure the water body's physical characteristics are maintained in as good a condition as possible without significantly impacting on a designated use or the wider environment. Water quality is good. Other pressures are causing no more than slight ecological effects.

[5]The Scotland River Basin District (Classification of Water Bodies) Directions 2009 www.scotland.gov.uk/Publications/2009/12/14130729/0
[6]www.scotland.gov.uk/Publications/2009/12/14130729/3
[7]www.wfduk.org/tag_guidance/Article%20_11/POMEnvStds/gep_guidance_final

Table 3: Classification status classes for heavily modified and artificial water bodies (continued)

Ecological potential class	Basis of classification
Moderate, poor or bad	All practicable mitigation measures, other than those expected to cumulatively provide only very minor ecological benefit, are in place to ensure the water body's physical characteristics are maintained in as good a condition as possible without significantly impacting on a designated use or the wider environment. BUT Water quality is less than good or other pressures are having more than slight ecological impacts. OR Not all practicable mitigation measures, other than those expected to cumulatively provide only very minor ecological benefit, are in place[8].

In practice, it has not always been possible to differentiate between water bodies whose physical characteristics are consistent with good ecological potential and those where they are consistent with maximum ecological potential. Consequently, the physical characteristics of many HMWBs bodies have been classified as being consistent with good or maximum ecological potential.

3.1 Classification results for impacts from designated uses

We have split the classification results for HMWBs and AWBs into:

- classification of the water body's physical characteristics related to the designated use;
- classification of the overall ecological potential once water quality and other factors are taken into account.

This split makes it clear where mitigation measures related to the designated use are in place and where other factors (eg water quality or the presence of invasive non-native species) not related to the designated use are affecting the overall ecological potential classification.

The assessments of the ecological potential class that the physical characteristics of HMWBs and AWBs bodies in the Scotland RBD can support are summarised in Map 1 and in Tables 4a and 4b in terms of:

(a) surface water category (river, loch, estuary, coastal);

(b) designated use of the water body.

These results are based on the information available to SEPA as of September 2009.

If you want to find out about the classification results for a particular water body, please use the interactive map on SEPA's website at: www.sepa.org.uk/water/river_basin_planning.aspx

[8]For a HMWB for which the mitigation needed to achieve good ecological potential is not in place, classification as moderate, poor or bad indicates the relative severity of the ecological impacts of the bodies' physical alterations.

Table 4(a): Classification of the ecological potential that the physical characteristics of heavily modified and artificial water bodies can support (ie assessment excludes consideration of pollution, invasive non-native species, etc)

Type		Maximum or good	Moderate	Poor	Bad
River	Number	135	30	44	58
	Length (km)	1,368	272	425	658
Loch/reservoir	Number	65	4	13	14
	Area (km²)	258	6	19	72
Estuary	Number	4	1	1	0
	Area (km²)	5	38	10	0
Coastal	Number	3	1	0	0
	Area (km²)	53	46	0	0
Artificial (canals)	Number	26	0	0	0
	Length (km)	167	0	0	0
Artificial (other) 1 river; 1 lake	Number	13	0	1	0
	Area (km²)	0.04	0	1	0
	Length (km)	20	0	0	0

Table 4(b): Classification of the ecological potential that the physical characteristics of heavily modified and artificial water bodies can support (ie assessment excludes consideration of pollution, invasive non-native species, etc) by purpose for which water body designated

Purpose for which water body designated		Maximum or good			Moderate			Poor			Bad		
2008		No	Lgth	Area	No	Lgth	Area	No	Lgth	Area	No	Lgth	Area
Navigation	Inland waterways such as canals	30	194	189	0	0	0	0	0	0	1	0	1
	Ports and harbours	4	0	52	0	0	0	0	0	0	0	0	0
Water storage	Drinking water supply	38	201	29	7	23	6	23	111	17	12	44	28
	Power generation	145	1036	236	12	104	0	15	144	0.8	46	453	42
	Navigation	0	0	0	0	0	0	0	0	0	0	0	0
Land drainage	Agriculture	4	22	0	3	42	0	5	34	0	5	74	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	14	96	12	14	103	84	18	160	11	9	93	0
Protection of wider environment	Biodiversity	23	106	25	1	5	0	6	16	3	2	0	3
	Built heritage	11	5	0.1	0	0.0	0	2	14	0.8	0	0	0

Map 1: Classification of the ecological potential that the physical characteristics of heavily modified and artificial water bodies can support (ie assessment excludes consideration of pollution, invasive non-native species, etc)

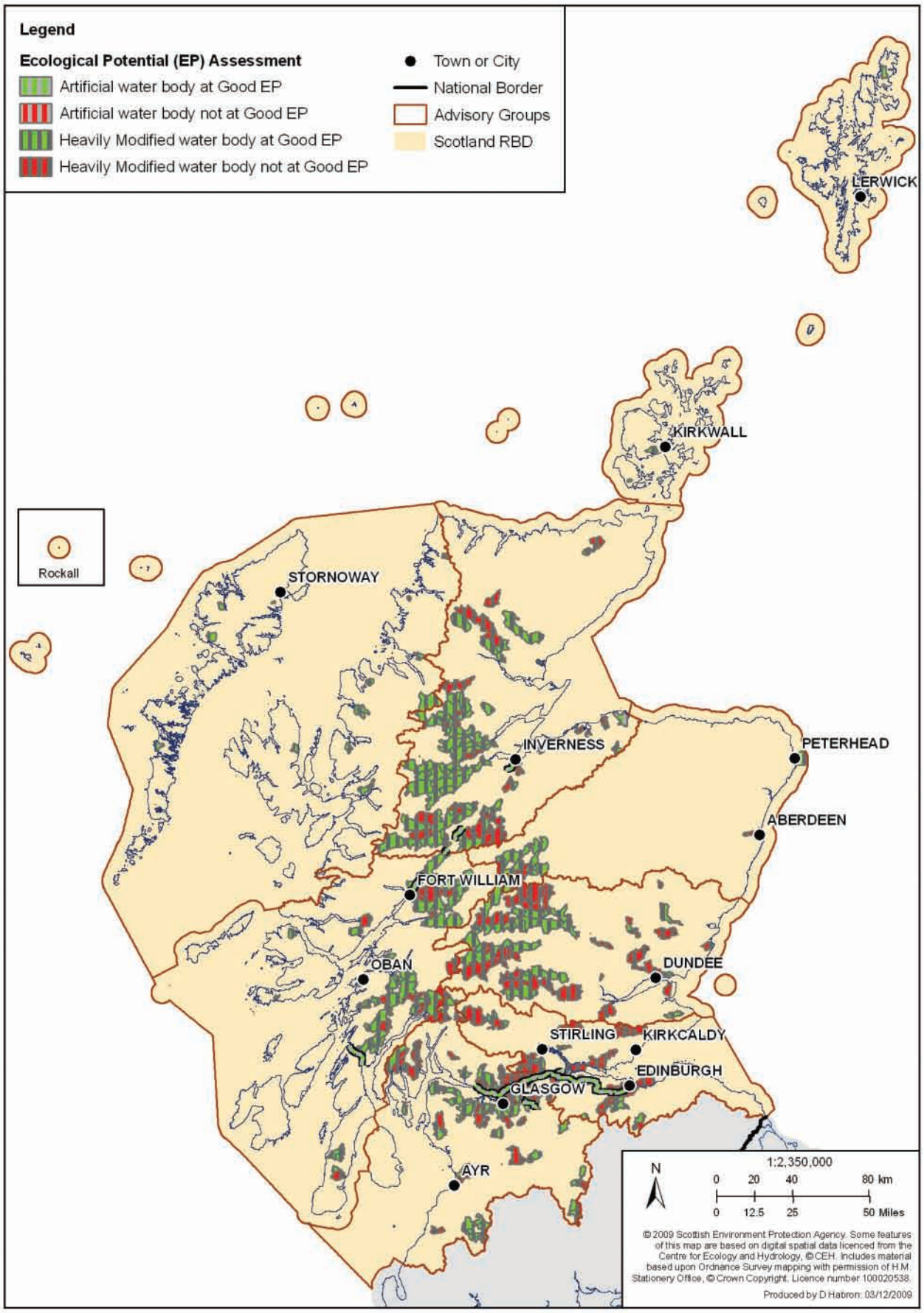


Table 5a, Table 5b and Map 2 combine the results set out in Tables 4a and 4b with SEPA's assessment of the impacts of the impacts of other pressures on the water bodies. The data on the effects of pollution and other pressures are based on information available from monitoring up to and including 2008.

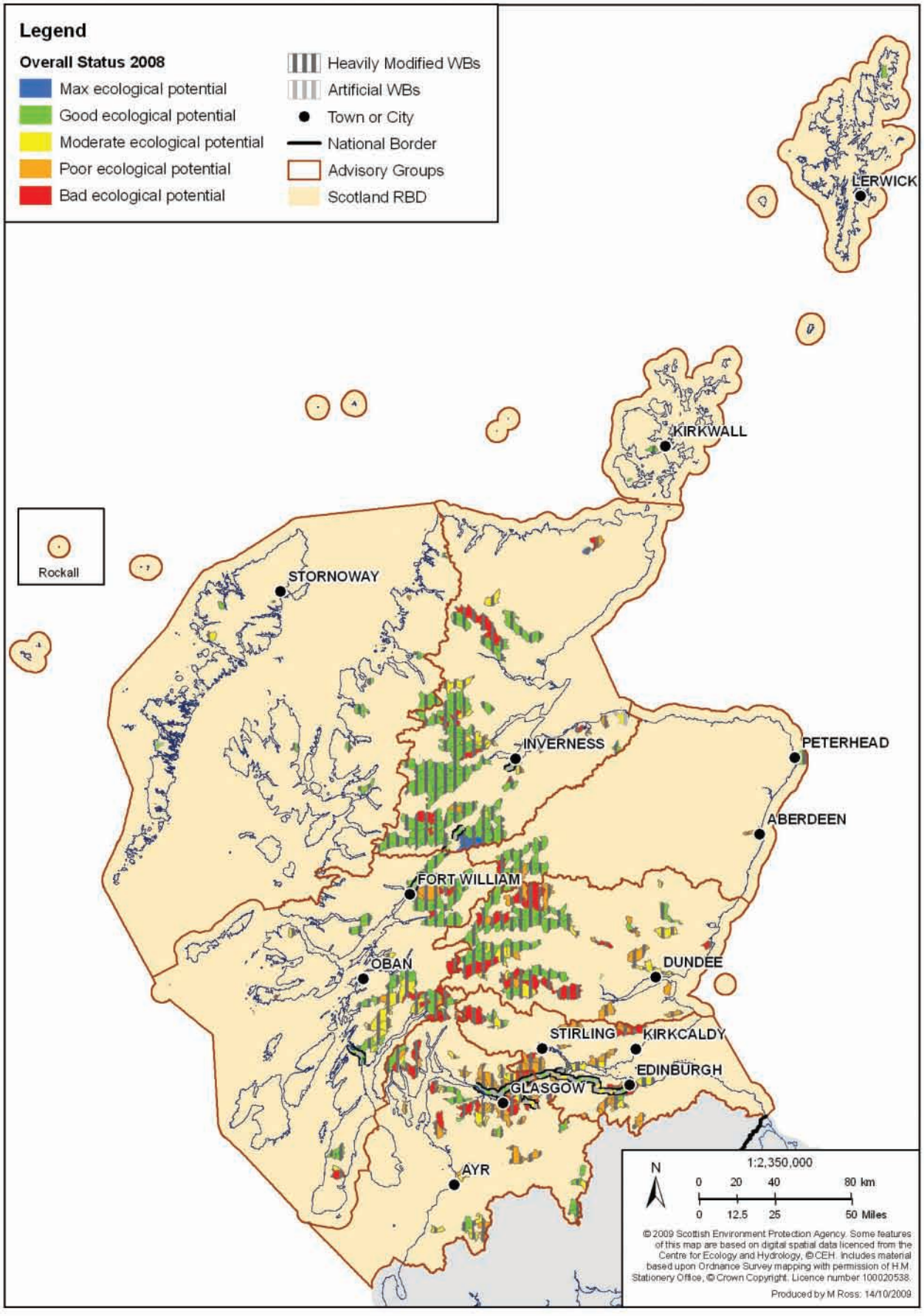
Table 5(a): Overall ecological potential classification results for 2008 for heavily modified and artificial water bodies

Type		Maximum or good	Moderate	Poor	Bad
River	Number	110	45	58	54
	Length (km)	1154	377	586	607
Loch/reservoir	Number	55	12	18	11
	Area (km²)	243	22	27	64
Estuary	Number	3	2	1	0
	Area (km²)	1	43	10	0
Coastal	Number	3	1	0	0
	Area (km²)	53	46	0	0
Artificial (canals)	Number	22	4	0	0
	Length (km)	127	40	0	0
Artificial (other)	Number	12	1	1	0
	Length (km)	0.04	0	0.82	0
	Area (km²)	13	7	0	0

Table 5(b): Overall ecological potential classification results for 2008 for heavily modified and artificial water bodies by purpose for which water body designated

Purpose for which water body designated		Maximum or good			Moderate			Poor			Bad		
2008		No	Lgth	Area	No	Lgth	Area	No	Lgth	Area	No	Lgth	Area
Navigation	Inland waterways such as canals	24	140	17	4	40	0	1	0	1	2	13	1
	Ports and harbours	3	0	47	1	0	4	0	0	0	0	0	0
Water storage	Drinking water supply	28	135	29	15	47	12	25	154	11	12	44	29
	Power generation	137	1026	224	29	216	11	17	144	11	35	352	33
	Navigation	0		0	0	0	0	0	0	0	0	0	0
Land drainage	Agriculture	2	8	0	5	54	0	6	41	0	4	68	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	5	0	8	14	80	89	25	249	11	11	123	0
Protection of wider environment	Biodiversity	13	60	21	3	14	1	13	45	6	3	8	3
	Built heritage	11	5	0.04	0	0	0	2	14	0.82	0	0	0

Map 2: Overall ecological potential classification results for 2008 for heavily modified and artificial water bodies



4. Objectives for heavily modified and artificial water bodies

Our objectives for improving the ecological potential of HMWBs and AWBs are intended to strike the right balance between the protection and improvement of the water environment (taking account of the benefits this brings) and the interests of those who depend on it for their livelihoods and quality of life. By definition, none of the objectives should have a significant adverse affect on the beneficial objectives served by the modified or artificial characteristics of the water bodies.

Further information on how we have set objectives is described in Chapter 2 available online at www.sepa.org.uk/water/river_basin_planning.aspx The process of setting objectives for HMWBs and AWBs has benefited in particular from information provided by water users and other interested parties in a series of workshops organised by SEPA.

If you would like information on the objectives for particular water bodies, please use the interactive map on SEPA's website at: www.sepa.org.uk/water/river_basin_planning.aspx

The improvements identified for HMWBs and AWBs have been split into:

- improvements to the bodies' heavily modified or artificial physical characteristics;
- improvements to the overall ecological potential.

This makes it clear where improvements related to the designated use are being made by water managers and where other factors (eg water quality) not related to the designated use are affecting the overall ecological potential..

For a number of water bodies, we have phased improvements to the bodies's heavily modified or artificial physical characteristics. Among other benefits, this will enable significant environmental improvements to be made without significant adverse impacts on the benefits provided by the uses of water bodies. For example, if made straight away, an improvement that would result in a given reduction in the output provided by a use might constitute a significant adverse impact. However, if phased over the longer term, the reduction might be offset by increases in output made elsewhere during the intervening period and consequently not represent a significant adverse impact.

4.1 Improvement objectives for HMWBs and ASWBs

Tables 6 and 7 provide summary information on our objectives for:

- HMWBS used to provide water storage for hydropower generation, public water supply, flood protection, land drainage or navigation;
- HMWBs and AWBs used for inland navigation.

The improvements for the physical characteristics of the heavily modified and artificial water bodies were identified based on consideration of:

- the confidence in the classification;
- the spatial extent of adverse impacts;
- the scale of mitigation required and hence the costs and the extent of technical planning and preparation required;
- planned asset refurbishment or replacement schedules.

These considerations helped to identify environmental priorities and balance them against judgements of what was likely to be technically feasible and proportionate to achieve over a given timescale. Those companies and organisations relying on the heavily modified or artificial characteristics provided information to SEPA to inform these judgements. As described in Annex 2: Consultation and engagement, other stakeholders were also consulted as part of this process.

Table 6(a): Improvement objectives for 2015 for the modified or artificial physical characteristics of water bodies designated as heavily modified or artificial

		Maximum or good		Moderate		Poor		Bad	
Type		2008	2015	2008	2015	2008	2015	2008	2015
River	Number	135	162	30	39	44	33	58	33
	Length (km)	1,368	1,675	272	354	425	324	658	370
Loch/ reservoir	Number	65	86	8	2	13	4	14	4
	Area (km²)	258	339	6	5	19	3	72	9
Estuary	Number	4	4	1	1	1	1	0	0
	Area (km²)	5	5	38	38	10	10	0	0
Coastal	Number	3	3	1	1	0	0	0	0
	Area (km²)	53	53	46	46	0	0	0	0
Artificial (canals)	Number	26	26	0	0	0	0	0	0
	Length (km)	168	168	0	0	0	0	0	0
Artificial (other) 1 river; 1 lake	Number	13	12	0	2	1	0	0	0
	Area (km²)	0.06	0.06	0	0.82	0.82	0	0	0
	Length (km)	20	13	0	7	0	0	0	0

Table 6(b): Improvement objectives for 2021 and 2027 for the modified or artificial physical characteristics of water bodies designated as heavily modified or artificial

		Maximum or good		Moderate		Poor		Bad	
Type		2021	2027	2021	2027	2021	2027	2021	2027
River	Number	180	267	33	0	26	0	28	0
	Length (km)	1,839	2,723	290	0	263	0	331	0
Loch/reservoir	Number	87	96	2	0	3	0	4	0
	Area (km²)	340	356	5	0	3	0	9	0
Estuary	Number	4	6	1	0	1	0	0	0
	Area (km²)	5	53	38	0	10	0	0	0
Coastal	Number	3	4	1	0	0	0	0	0
	Area (km²)	53	99	46	0	0	0	0	0
Artificial (canals)	Number	26	26	0	0	0	0	0	0
	Length (km)	167	167	0	0	0	0	0	0
Artificial (other) 1 river; 1 lake	Number	12	14	2	0	0	0	0	0
	Area (km²)	0.06	0.88	0.82	0	0	0	0	0
	Length (km)	13	20	7	0	0	0	0	0

Table 7(a): Projected improvements by 2015 to the hydromorphological characteristics of water bodies designated as heavily modified or artificial by purpose for which water body designated

Purpose for which water body designated		Maximum or good		Moderate		Poor		Bad	
		2008	2015	2008	2015	2008	2015	2008	2015
Navigation	Inland waterways such as canals	30	29	0	0	0	1	1	1
	Ports and harbours	4	4	0	0	0	0	0	0
Water storage	Drinking water supply	38	59	7	8	23	7	12	6
	Power generation	145	170	12	13	15	10	46	25
Land drainage	Agriculture	4	6	3	6	5	3	5	2
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	14	16	14	18	18	18	9	3
Protection of wider environment	Biodiversity	23	25	1	3	6	4	2	0
	Built heritage	11	11	0	1	2	1	0	0
Purpose for which water body designated		**Maximum or good**		**Moderate**		**Poor**		**Bad**	
		Length	Area	Length	Area	Length	Area	Length	Area
Navigation	Inland waterways such as canals	181	19	0	0	13	0	0	1
	Ports and harbours	0.0	52	0	0	0	0	0	0
Water storage	Drinking water supply	246	67	367	5	53	3	44	6
	Power generation	1312	278	91	0	85	0	250	1
Land drainage	Agriculture	35	0	73	0	14	0	50	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	79	13	167	84	178	10	26	0
Protection of wider environment	Biodiversity	106	28	145	0	6	3	0	0
	Built heritage	5	0.1	0	0.8	14	0	0	0

Table 7(b): Projected improvements by 2021 and 2027 to the hydromorphological characteristics of water bodies designated as heavily modified or artificial by purpose for which water body designated

Purpose for which water body designated		Maximum or good		Moderate		Poor		Bad	
		2021	2027	2021	2027	2021	2027	2021	2027
Navigation	Inland waterways such as canals	30	31	0	0	0	0	1	0
	Ports and harbours	4	4	0	0	0	0	0	0
Water storage	Drinking water supply	61	80	6	0	7	0	6	0
	Power generation	175	218	12	0	9	0	22	0
Land drainage	Agriculture	6	17	6	0	3	0	2	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	27	55	14	0	13	0	1	0
Protection of wider environment	Biodiversity	26	32	3	0	3	0	0	0
	Built heritage	12	13	1	0	0	0	0	0

Purpose for which water body designated		Maximum or good		Moderate		Poor		Bad	
	2021	Length	Area	Length	Area	Length	Area	Length	Area
Navigation	Inland waterways such as canals	194	19	0	0	0	0	0	1
	Ports and harbours	0	52	0	0	0	0	0	0
Water storage	Drinking water supply	235	62	22	8	79	5	44	6
	Power generation	1304	244	117	0	104	34	214	1
Land drainage	Agriculture	35	0	73	0	14	0	50	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	217	12	118	84	118	12	0	0
Protection of wider environment	Biodiversity	106	27	15	0	6	4	0	0
	Built heritage	19	0.9	0	0	0	0	0	0

Purpose for which water body designated		Maximum or good		Moderate		Poor		Bad	
	2027	Length	Area	Length	Area	Length	Area	Length	Area
Navigation	Inland waterways such as canals	194	20	0	0	0	0	0	0
	Ports and harbours	0	52	0	0	0	0	0	0
Water storage	Drinking water supply	380	80	0	0	0	0	0	0
	Power generation	1738	279	0	0	0	0	0	0
Land drainage	Agriculture	171	0	0	0	0	0	0	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	452	107	0	0	0	0	0	0
Protection of wider environment	Biodiversity	126	31	0	0	0	0	0	0
	Built heritage	19	0.9	0	0	0	0	0	0

4.2 Overall improvement objectives for HMWBs and AWBs

Tables 8 and 9 combine the improvements planned to the modified or artificial physical characteristics of heavily modified and artificial water bodies with the improvements planned to address the impacts of other pressures, such as pollution.

Table 8(a): Overall ecological potential objectives for heavily modified and artificial water bodies by 2015

		Maximum or good		Moderate		Poor		Bad	
Type		2008	2015	2008	2015	2008	2015	2008	2015
River	Number	110	131	45	55	58	42	54	39
	Length (km)	1154	1363	376	499	586	414	607	447
Loch/reservoir	Number	55	62	12	14	18	16	11	4
	Area (km²)	243	269	22	25	27	53	64	9
Estuary	Number	3	3	2	2	1	1	0	0
	Area (km²)	1	1	43	43	10	10	0	0
Coastal	Number	3	3	1	1	0	0	0	0
	Area (km²)	53	53	46	46	0	0	0	0
Artificial (canals)	Number	22	24	4	2	0	0	0	0
	Length (km)	127	155	40	12	0	0	0	0
Artificial (other) 1 river; 1 lake	Number	12	12	1	1	1	1	0	0
	Area (km²)	0.04	0.04	0	0	0.82	0.82	0	0
	Length (km)	13	13	7	7	0	0	0	0

Table 8(b): Overall ecological potential objectives for heavily modified and artificial water bodies by 2021 and 2027

		Maximum or good		Moderate		Poor		Bad	
Type		2021	2027	2021	2027	2021	2027	2021	2027
River	Number	155	265	49	2	32	0	31	0
	Length (km)	1569	2708	452	15	325	0	377	0
Loch/reservoir	Number	67	95	12	0	13	1	4	0
	Area (km²)	282	355	22	0	43	0.56	9	0
Estuary	Number	3	6	2	0	1	0	0	0
	Area (km²)	1.1	53	43	0	10	0	0	0
Coastal	Number	3	4	1	0	0	0	0	0
	Area (km²)	53	99	46	0	0	0	0	0
Artificial (canals)	Number	24	26	2	0	0	0	0	0
	Length (km)	155	167	12	0	0	0	0	0
Artificial (other) 1 river; 1 lake	Number	12	14	2	0	0	0	0	0
	Area (km²)	0.04	0.86	0.82	0	0	0	0	0
	Length (km)	13	20	7	0	0	0	0	0

Table 9(a): Overall ecological potential objectives for heavily modified and artificial water bodies by 2015 by purpose for which water body designated

Purpose for which water body designated		Maximum or good		Moderate		Poor		Bad	
		2008	2015	2008	2015	2008	2015	2008	2015
Navigation	Inland waterways such as canals	24	26	4	2	1	2	2	1
	Ports and harbours	3	3	1	1	0	0	0	0
Water storage	Drinking water supply	28	39	15	18	25	17	12	6
	Power generation	137	149	29	30	17	14	35	25
Land drainage	Agriculture	2	2	5	8	6	3	4	4
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	5	8	14	19	25	21	11	7
Protection of wider environment	Biodiversity	13	16	3	7	13	9	3	0
	Built heritage	11	11	0	0	2	2	0	0
Purpose for which water body designated		**Maximum or good**		**Moderate**		**Poor**		**Bad**	
	2015	**Length**	**Area**	**Length**	**Area**	**Length**	**Area**	**Length**	**Area**
Navigation	Inland waterways such as canals	169	17	12	0	13	1	0	1
	Ports and harbours	0	47	0	4	0	0	0	0
Water storage	Drinking water supply	187	54	40	14	109	7	44	6
	Power generation	1142	225	251	11	95	42	250	1
Land drainage	Agriculture	8	0	81	0	14	0	68	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	26	8	147	89	193	11	86	0
Protection of wider environment	Biodiversity	78	21	24	34	24	6	0	0
	Built heritage	5	0	0	0	14	0.8	0	0

Table 9(b): Overall ecological potential objectives for heavily modified and artificial water bodies by 2021 and 2027 by purpose for which water body designated

Purpose for which water body designated		Maximum or good		Moderate		Poor		Bad	
		2021	2027	2021	2027	2021	2027	2021	2027
Navigation	Inland waterways such as canals	27	31	2	0	1	0	1	0
	Ports and harbours	3	4	1	0	0	0	0	0
Water storage	Drinking water supply	44	79	14	1	16	0	6	0
	Power generation	160	217	24	1	12	0	22	0
Land drainage	Agriculture	3	17	8	0	3	0	3	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	17	55	20	0	15	0	3	0
Protection of wider environment	Biodiversity	19	31	7	0	6	1	0	0
	Built heritage	12	13	1	0	0	0	0	0
Purpose for which water body designated		**Maximum or good**		**Moderate**		**Poor**		**Bad**	
	2021	**Length**	**Area**	**Length**	**Area**	**Length**	**Area**	**Length**	**Area**
Navigation	Inland waterways such as canals	182	17	12	0	0	1	0	1
	Ports and harbours	0	47	0	4	0	0	0	0
Water storage	Drinking water supply	214	57	25	11	97	7	44	6
	Power generation	1220	233	201	11	93	34	225	1
Land drainage	Agriculture	18	0	75	0	14	0	64	0
Urban development	Modifications in urban areas for land drainage, flood protection, land claim and/or maintenance of human safety	100	8	164	89	142.74	11	45	0
Protection of wider environment	Biodiversity	89	23	24	4	13	4	0	0
	Built heritage	19	0.04	0	0.82	0	0	0	0