# Appendices to the river basin management plan for the Scotland river basin district: 2015 – 2027

# 21 December 2015



**Working together to protect and improve our water environment**

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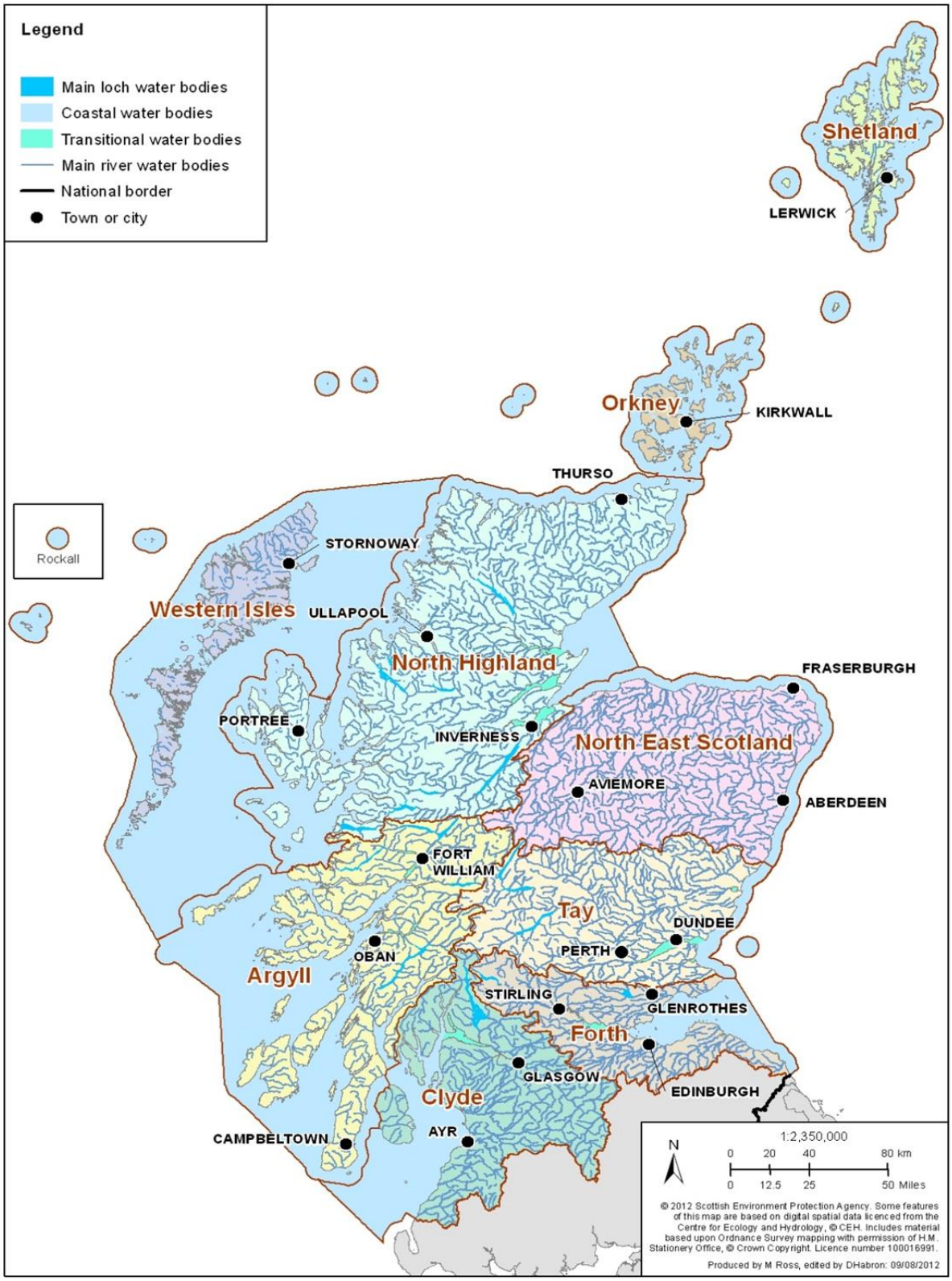
# Appendix 1: Competent authorities

| **List of competent authorities and their responsibilities** | | |
|---|---|---|
| Name of authority | **Scottish Ministers** comprising:<br>• The First Minister;<br>• other Scottish Ministers appointed by the First Minister;<br>• the Lord Advocate;<br>• the Solicitor-General for Scotland | **The Scottish Environment Protection Agency (SEPA)** |
| Address | Water Environment Team<br>Environmental Quality Division<br>Scottish Government<br>Area 1-D North<br>Victoria Quay<br>Edinburgh EH6 6QQ | Scottish Environment Protection Agency<br>Strathallan House<br>Castle Business Park<br>Stirling<br>FK9 4TZ<br>http://www.sepa.org.uk/contact/<br>rbmp@sepa.org.uk |
| Legal status | The Scotland Act 1998 | The Environment Act 1995 |
| Responsibilities *(and corresponding Article of the Directive)* | Exercising relevant functions so as to secure compliance with the requirements of the Water Framework Directive<br>Designation of river basin districts *(Article 3)*<br>Identification of bodies of water used for the abstraction for drinking water *(Article 7)*<br>*Fixing of charges for water services (Article 9)*<br>Establishing the controls and other measures required for the programme of measures *(Article 11)*<br>Finalising and approving the river basin management plan and updates thereof *(Article 13)*<br>Identifying shellfish water protected areas | Exercising relevant functions so as to secure compliance with the requirements of the Water Framework Directive<br>Setting environmental objectives *(Article 4)*<br>Characterisation of the district *(Article 5)*<br>Establishing and maintaining a register of protected areas *(Article 6)*<br>Monitoring of surface water status, groundwater status and protected areas *(Article 8)*<br>Preparing a programme of measures *(Article 11)*<br>Preparing the river basin plan and updates thereof *(Article 13)*<br>Publicising and consulting on the development of the river basin plan and updates thereof *(Article 14)*<br>Maintaining a register of emissions, discharges and losses priority substances |

| List of competent authorities and their responsibilities continued | | |
|---|---|---|
| Name of authority | **Scottish Ministers** | **Scottish Environment Protection Agency (SEPA)** |
| Relevant legal functions | Functions and duties specified in:<br>The Water Environment & Water Services (Scotland) Act 2003<br>The Water Environment (River Basin Management Planning: Further Provision) Scotland Regulations 2013<br>The enactments listed in Schedule 1 of The Water Environment (Relevant Enactments and Designation of Responsible Authorities and Functions) (Scotland) Order 2011 | Functions and duties specified in:<br>The Water Environment & Water Services (Scotland) Act 2003<br>The Water Environment (River Basin Management Planning: Further Provision) Scotland Regulations 2013<br>The enactments listed in Schedule 1 of The Water Environment (Relevant Enactments and Designation of Responsible Authorities and Functions) (Scotland) Order 2011<br>The Water Environment (Shellfish Water Protected Areas: Environmental Objectives etc) (Scotland) Regulations 2013<br>The Scotland River Basin District (Standards) Directions 2014<br>The Scotland River Basin District (Status) Directions 2014<br>The Scotland River Basin District (Quality of Shellfish Water Protected Areas (Scotland) Directions 2015<br>The Chemical Analysis of Water Status (Technical Specifications) (Scotland) No.2) Directions 2011 |

| Geographical coverage of the river basin district | | | |
|---|---|---|---|
| **Names of the main rivers in the district** | | | |
| **South east**<br>River Esk<br>Water of Leith<br>River Almond<br>River Avon<br>River Carron | **Forth and Tay**<br>River Forth<br>River Leven<br>River Eden<br>River Tay | **East coast**<br>River South Esk<br>River North Esk<br>River Dee<br>River Don<br>River Ythan | **Moray coast – south**<br>River Deveron<br>River Spey<br>River Lossie<br>River Findhorn<br>River Nairn<br>River Ness |
| **Moray firth – north**<br>River Beauly<br>River Conon<br>River Carron<br>River Oykel<br>River Shin<br>River Brora<br>Wick River | **North coast**<br>River Thurso<br>River Naver<br>Halladale River<br>River Hope | **North west**<br>River Laxford<br>River Kirkaig<br>River Ewe<br>River Shiel<br>River Aline<br>River Awe | **Firth of Clyde**<br>River Clyde<br>River Garnock<br>River Irvine<br>River Ayr<br>River Doon |

**Figure A1: Boundaries of the river basin district and Area Advisory Groups**



| Contact point and procedures for obtaining background documents and information used for the development of the plan | |
|---|---|
| Documents and information are available | |
| Via the competent authority web pages | www.gov.scot/Topics/Environment/Water/15561<br>www.sepa.org.uk/water/river_basin_planning.aspx<br>www.environment.scotland.gov.uk/get-informed/water/ |
| By emailing, telephoning or writing to SEPA | River Basin Planning Unit Manager<br>SEPA, Strathallan House, Castle Business Park, Stirling FK9 4TZ<br>Tel: 01786 457700<br>Email: rbmp@sepa.org.uk |

# Appendix 2: Characterisation, monitoring and classification

This appendix is divided into three parts describing:

(a) characteristics of the river basin district;
(b) economic analysis of water use;
(c) monitoring and classification.

Detailed information about the characteristics of the district and about monitoring and classification is available on the **Water environment hub** or via the background documents referenced in this appendix. Should you need help obtaining any information, please contact SEPA. SEPA's contact details and the associated procedures are described in Appendix 1.

## Characteristics of the river basin district

This part of the appendix, together with the information referred to on the **Water environment hub**, provides a general description of the characteristics of the river basin district.

To help with the development of the plan, we undertook a major review of the district's characteristics in 2013 and set out the results in a report, *Current Condition and Challenges for the Future: Scotland river basin district*. However, the process of reviewing and updating our assessments of pressures and impacts on the water environment has been ongoing throughout the period of 2009 to 2015 and will continue as our understanding improves and pressures shift and change.

**Table A2.1: Location and boundaries of bodies of surface water**

**Summary of changes and updates since 2009**
We have refined the boundaries of a number of bodies of surface water. This has included splitting some water bodies into more than one body to reflect our improving understanding of how the condition of the water environment varies from place to place. As a result, the number of bodies of surface water in the district has increased from 2,811 in 2009 to 2,825.

| Surface water category | Coverage of water bodies | No. of water bodies | No. excluding heavily modified and artificial | No. heavily modified or artificial[1] | Location and boundaries |
|---|---|---|---|---|---|
| River | • All watercourses or parts thereof in the district with a catchment area greater than 10km$^2$;<br>• coastal streams with a catchment areas of 10km$^2$ or less but which fulfil one or more of the criteria in UK guidance on the identification of small water bodies;<br>• all small lakes connected to watercourses within the catchment of a river water body that do not meet the criteria below for identification as lake water bodies;<br>• the main stem of each water body together with the network of tributary watercourses draining to that main stem. | 2,028 | 1,684 | 344 | **Water environment hub** |

**Table A2.1: Location and boundaries of bodies of surface water continued**

| Surface water category | Coverage of water bodies | No. of water bodies | No. excluding heavily modified and artificial | No. heavily modified or artificial[1] | Location and boundaries |
|---|---|---|---|---|---|
| Lake (freshwater lochs) | • All lochs or parts thereof in the district with a surface area greater than 0.5km$^2$;<br>• Lochs with a surface area of 0.5 km$^2$ or less but which fulfil one or more of the criteria in UK guidance on the identification of small water bodies;<br>• Any short lengths of river that do not meet the criteria above for identification as a river water body that connect a lake water body to an estuary or coastal water body. | 309 | 212 | 97 | **Water environment hub** |
| Estuary (transitional) | • All estuaries or parts thereof in the district with a surface area greater than 0.5km$^2$ or a length longer than 1km;<br>• Estuaries with an area of 0.5km$^2$ or less and a length of 1km or shorter but which fulfil one or more of the criteria in UK guidance on the identification of small water bodies. | 39 | 31 | 8 | **Water environment hub** |
| Coastal water | • All coastal water in the district from mean high water spring tidal limit and a distance of three nautical miles seaward of the baseline from which UK territorial waters are measured. | 449 | 436 | 13 | **Water environment hub** |
| All | | 2,825 | 2,363 | 462 | |

**Note to table A2.1:** [1] Further information on the identification of heavily modified and artificial water bodies is provided in Appendix 3.

**Table A2.2: Characterisation of surface water body types**

**Summary of changes and updates since 2009**
We have not made any changes to the general characterisation of water body types we included in the first plan in 2009. However, we have refined the sub-types we use in defining reference values for hydromorphological, physicochemical, and biological reference conditions (see relevant sections below).

| Surface water category | Ecoregion | System used to differentiate types | Criteria used to characterise types | No. of different types in the district | Mapping of types |
|---|---|---|---|---|---|
| River | Great Britain | System A in accordance with UK guidance | • mean catchment altitude;<br>• catchment size;<br>• dominant geology. | 20 | **Water environment hub** |
| Lake (freshwater lochs) | Great Britain | System B adapted in accordance with UK guidance | • latitude and longitude (ecoregion);<br>• catchment geology;<br>• depth. | 16 | **Water environment hub** |
| Estuary (transitional) | North Sea;<br>Atlantic Ocean | System B in accordance with UK guidance | • latitude and longitude (ecoregion);<br>• tidal range;<br>• salinity;<br>• mixing characteristics;<br>• mean substratum composition;<br>• wave exposure;<br>• depth. | 3 | **Water environment hub** |
| Coastal water | North Sea;<br>Atlantic Ocean | System B in accordance with UK guidance | • latitude and longitude (ecoregion);<br>• tidal range;<br>• salinity (euhaline);<br>• wave exposure. | 8 | **Water environment hub** |

**Table A2.3: Establishment of hydromorphological and physicochemical reference conditions for bodies of surface water**

| Surface water body category | Condition | Types for which reference conditions identified | Reference conditions | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|---|
| Rivers;<br>freshwater lochs;<br>estuaries;<br>coastal waters | Morphological conditions<br>• physical condition of beds, banks and shores | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | Standards for high status in Schedule 3 to the Scotland River Basin District (Standards) Directions 2014<br><br>For coastal waters, the reference morphological conditions take account of modifications that would affect the direction of dominant currents.<br>For estuaries and coastal waters, the reference morphological conditions take account of modifications that would affect wave exposure. | Revised for rivers, estuaries and coastal waters |
| Rivers;<br>freshwater lochs | Hydrological regime<br>• water flows and levels | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | Standards for high status in Part B of Schedule2 to the Scotland River Basin District (Standards) Directions 2014<br><br>For rivers, the reference conditions for water flows take account of the connection to bodies of groundwater (in terms of groundwater flow) expected under reference conditions. | Revised for loch water levels (review detail) |
| Rivers | River continuity<br>• access for fish migration | All | Standards for high status in Schedule 3 to the Scotland River Basin District (Standards) Directions 2014 | No change |

**Table A2.3: Establishment of hydromorphological and physicochemical reference conditions for bodies of surface water continued**

| Surface water body category | Condition | Types for which reference conditions identified | Reference conditions | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|---|
| Estuaries | Tidal regime<br>• freshwater flow | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | Standards for good status in Schedule 3 to the Scotland River Basin District (Standards) Directions 2014 | No change |
| Rivers | General physicochemical conditions<br>• oxygenation conditions<br>• thermal conditions (temperature)<br>• acidification status<br>• nutrient conditions | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | Standards for high status in Part C of Schedule 2 to the Scotland River Basin District (Standards) Directions 2014 | Revised for nutrient conditions (further detail) and acidification status (further detail) |
| | General physicochemical conditions<br>• salinity | All | Reference conditions correspond to the observed mean salinity of the river water body concerned. This is because there are no pressures in the district that have more than very minor effects on the salinity of river water bodies | No change |

**Table A2.3: Establishment of hydromorphological and physicochemical reference conditions for bodies of surface water continued**

| Surface water body category | Condition | Types for which reference conditions identified | Reference conditions | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|---|
| Freshwater lochs | General physicochemical conditions<br>• oxygenation conditions<br>• salinity<br>• acidification status<br>• nutrient conditions | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | Standards for high status in Part C of Schedule 2 to the Scotland River Basin District (Standards) Directions 2014 | No change |
| Estuaries;<br>coastal waters | General physicochemical conditions<br>• oxygenation conditions<br>• nutrient conditions | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | Standards for high status in Part C of Schedule 2 to the Scotland River Basin District (Standards) Directions 2014 | No change |

**Table A2.3: Establishment of hydromorphological and physicochemical reference conditions for bodies of surface water continued**

| Surface water body category | Condition | Types for which reference conditions identified | Reference conditions | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|---|
| Coastal waters | General physicochemical conditions<br>• salinity<br>• thermal conditions | All | Reference conditions correspond to the observed mean salinity and mean temperature of the coastal water body concerned. This is because there are no pressures in the district that have more than very minor effects on the salinity or thermal conditions of coastal waters. | No change |
| Rivers; freshwater lochs; estuaries; coastal waters | Specific pollutants selected following peer review on the basis of nationally-established method which takes account of:<br>• hazardous properties – the persistence, potential to bioaccumulate and toxicity;<br>• potential environmental exposure – based on the level and pattern of use and/or on data from monitoring. | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | Standards for high status or (if no standard for high status is specified) good status in Part C of Schedule 2 to the Scotland River Basin District (Standards) Directions 2014 unless a separate standard for high status is specified.<br>A standard for high status is only specified for ammonia in rivers and freshwater lochs. In all other cases, the standard for good equates to a no effects concentration identified by UK experts. | Revised for six pollutants and established for an additional 10 pollutants |

**Table A2.4: Cases where the establishment of hydromorphological or physicochemical reference conditions was not possible**

| Condition for which a reference value has not been established | Surface water category for which the reference value has not been established | Reason reference value has not been established | Implications for assessments of the condition of the water environment |
|---|---|---|---|
| Salinity | Estuaries | High degrees of natural variability mean that it was not possible to establish reliable reference conditions | The salinity of estuaries could be significantly affected by changes to freshwater flow or tidal flow. The reference conditions we have established for freshwater flow and for physical condition ensure pressures that could affect salinity are reflected in our assessments of the condition of estuaries. |
| Transparency | Freshwater lochs;<br>Estuaries;<br>Coastal waters | High degrees of natural variability mean that it was not possible to establish reliable reference conditions | Changes in transparency can be caused by:<br>• an increase in the biomass of phytoplankton resulting from nutrient enrichment. The reference conditions we have established for nutrient conditions and for phytoplankton in lochs, estuaries and coastal waters ensure pollution by nutrients is reflected in our assessments of the condition of the water environment;<br>• the release into the water of fine sediments (a) from the bed, banks or shores as a result of engineering works in water bodies; or (b) urban and rural land management, including construction, agriculture and forestry. Our programme of measures (see Appendix 8) includes measures to control and minimise the risk of fine sediment releases as a result of such activities. |

| Condition for which a reference value has not been established | Surface water category for which the reference value has not been established | Reason reference value has not been established | Implications for assessments of the condition of the water environment |
|---|---|---|---|
| Thermal conditions | Estuaries | High degrees of natural variability mean that it was not possible to establish reliable reference conditions | The thermal condition of estuaries could be affected by changes to freshwater flow or tidal flow. The reference conditions we have established for freshwater flow and for physical condition ensure pressures that could affect thermal condition are reflected in our assessments of the condition of estuaries. |
| | Freshwater lochs | We have been unable to identify an ecologically-relevant reference value for thermal conditions in lochs as a result of the difficulty in establishing a relationship between the condition of water plants and animals and the complex thermal structure created by temperature gradients. | The thermal condition of lochs could be significantly affected by water impoundment and consequent changes to water flows and levels. The reference conditions we have established for water levels and physical condition ensure that pressures that could affect the thermal condition of lochs are reflected in our assessments of the condition of the water environment. |

**Table A2.5: Establishment of reference conditions for plants and animals in rivers**

| Water plants or animals | Types for which reference conditions identified | Where the reference condition is defined | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|
| Larger rooted or floating plants (macrophytes) | All | River Assessment Method, Macrophytes and Phytobenthos, Phytobenthos – Diatoms for Assessing River and Lake Ecological Quality (River DARLEQ2) | Revised |
| Small, bottom-living algae (phytobenthos) | All | River Assessment Method, Macrophytes and Phytobenthos, Phytobenthos – Diatoms for Assessing River and Lake Ecological Quality (River DARLEQ2) | Revised |
| Bottom-living invertebrate animals | All | River Assessment Method, Benthic Invertebrate Fauna, Invertebrates (General Degradation): Whalley, Hawkes, Paisley & Trigg (WHPT) metric in River Invertebrate Classification Tool (RICT)<br>An on-line version is available on SEPA's website | Revised |
| | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district | River Assessment Method, Benthic Invertebrate Fauna, Invertebrates (Anthropogenic Acidification): WFD Acid Water Indicator Community (WFD-AWIC) | Revised |
| Fish | All | River Assessment Method, Fish Fauna, Fisheries Classification Scheme 2 (FCS2) Scotland | Revised |

**Table A2.6: Cases where biological reference conditions for rivers have not been established**

| Water plant or animal for which a reference value has not been established | Reason reference value has not been established | Implications for assessments of the condition of the water environment |
|---|---|---|
| Microscopic plants in the water column (phytoplankton) | High degrees of natural variability mean that it was not possible to establish reliable reference conditions.<br>The district lacks the large, slow flowing rivers found in parts of continental Europe. Its relatively short, fast flowing rivers result in phytoplankton assemblages being absent or very short lived. | The reference conditions we have established for other water plants, physicochemical condition, river flows, and physical condition ensure that pressures that could affect any phytoplankton assemblages are reflected in our assessments of the condition of rivers. |

**Table A2.7: Establishment of reference plants and animals in freshwater lochs**

| Water plants or animals | Types for which reference conditions identified | Where the reference condition is defined | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|
| Microscopic plants in the water column (phytoplankton) | All | Lake Assessment Method, Phytoplankton, Phytoplankton Lake Assessment Tool with Uncertainty Module (PLUTO) | Revised |
| Larger rooted or floating plants (macrophytes) | All | Lake Assessment Method, Macrophytes and Phytobenthos, Macrophytes (Lake LEAFPACS2) | Revised |
| Small, bottom-living algae<br>(phytobenthos) | All sub-types identified in Schedule 1 to the Scotland River Basin District (Standards) Directions 2014<br>The sub-types collectively encompass all water bodies in the district. | Lake Assessment Method, Macrophytes and Phytobenthos, Phytobenthos – Diatoms for Assessing River and Lake Ecological Quality (Lake DARLEQ2) | Revised |

**Table A2.7: Establishment of reference plants and animals in freshwater lochs continued**

| Water plants or animals | Types for which reference conditions identified | Where the reference condition is defined | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|
| Bottom-living invertebrate animals | All | Lake Assessment Method, Benthic Invertebrate Fauna, Chironomid Pupal Exuviae Technique (CPET) | Revised |
| | All sub-types identified Schedule 1 to the Scotland River Basin District (Standards) Directions 2014 The sub-types collectively encompass all water bodies in the district. | Lake Assessment Method, Benthic Invertebrate Fauna, Lake Acidification Macroinvertebrate Metric (LAMM) | Revised |

**Table A2.8: Cases where biological reference conditions for lochs have not been established**

| Water plant or animal for which a reference value has not been established | Reason reference value has not been established | Implications for assessments of the condition of the water environment |
|---|---|---|
| Fish | We expect to establish reference conditions for fish in lochs and make assessments of the condition of fish in lochs during the period 2015 to 2021. The establishment of reference conditions was not completed in the period 2009 to 2015 because non-destructive techniques were insufficiently well developed. | The reference conditions we have established for other water plants, invertebrates, physicochemical condition, water levels, physical condition and invasive non-native species ensure that pressures that could affect fish are reflected in our assessments of the condition of lochs. |

**Table A2.9: Establishment of reference conditions for plants and animals in estuaries**

| Water plants or animals | Types for which reference conditions identified | Where the reference condition is defined | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|
| Microscopic plants in the water column (phytoplankton) | All | Transitional Water Assessment Method, Phytoplankton, Transitional Water Phytoplankton Tool | Newly established |
| Seaweeds (macroalgae) | All | Transitional Water Assessment Method, Macroalgae, Fucoid Extent Tool | Revised |
| | All | Transitional and Coastal Water Assessment Method, Macroalgae, Opportunistic Macroalgal Blooming Tool | Revised |
| Seagrasses (angiosperms) | All | Transitional and Coastal Water Assessment Method, Angiosperms, Intertidal Seagrass Tool | Newly established |
| Bottom-living invertebrate animals | All | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate Fauna, Infaunal Quality Index | Newly established |
| Fish | All | Transitional Water Assessment Method, Fish Fauna, Transitional Fish Classification Index | Revised |

**Table A2.10: Establishment of reference conditions for plants and animals in coastal waters**

| Water plants or animals | Types for which reference conditions identified | Where the reference condition is defined | Summary of changes and updates to reference conditions since 2009 |
|---|---|---|---|
| Microscopic plants in the water column (phytoplankton) | All | Coastal Water Assessment Method, Phytoplankton, Coastal Water Phytoplankton Tool | Revised |
| Seaweeds (macroalgae) | All | Transitional and Coastal Water Assessment Method, Macroalgae, Opportunistic Macroalgal Blooming Tool | Revised |
| | | Coastal Water Assessment Method, Macroalgae, Macroalgae - Intertidal Rocky Shore Macroalgal Index | No change |
| Seagrasses (angiosperms) | All | Transitional and Coastal Water Assessment Method, Angiosperms, Intertidal Seagrass Tool | Newly established |
| Bottom-living invertebrate animals | All | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate fauna, Invertebrates in Soft Sediments, Infaunal Quality Index | Revised |
| | | Coastal Water Assessment Method, Benthic Invertebrate Fauna, Assessment of Imposex in Nucella Lapillus (Dog Whelks) | No change |

**Table A2.11: Identification of significant pressures on bodies of surface water**

**Summary of changes and updates since 2009**
Over the period 2009 to 2015, we have improved our understanding of pressures and their impacts on bodies of surface waters. Among the reasons for this was the availability of a further six years of targeted environmental monitoring and developments in scientific knowledge of the environmental standards needed to protect aquatic plant and animals.

Pressures are identified as significant where they:

- have contributed to a breach of an environmental standard for good;
- are contributing to a risk that an environmental standard will be breached (e.g. contributing to an upward trend in the concentration of pollutants).

Information on all significant pressures and their impacts is included in the **Water environment hub** in the data maintained on each water body.

Appendix 5 identifies some of the work we will be doing over the period 2015 to 2021 to further improve our understanding of pressures on the water environment.

| **Type of pressure** | **Sources of information collected and held on the location and magnitude of pressure** | **Assessment of the effect of pressures** (including cumulatively) | **Assessment of the significance of pressures** (including cumulatively) |
|---|---|---|---|
| Point source discharges | • Location and permitted pollutant content of discharges specified in the authorisations for those discharges;<br>• Pollutant emission data supplied by operators of discharges as a condition of authorisation;<br>• Audits of compliance with authorisation conditions by regulators;<br>• Pollution emission data supplied for the purposes of the Scottish Pollutant Release Inventory;<br>• Chemical investigation programmes in relation to waste water discharges;<br>• Investigations to identify the sources of pollutants found in environmental monitoring results. | Environmental monitoring of pollutant concentrations supplemented by water quality modelling and trend analyses. | Application of the relevant standards for physicochemical conditions and water plants and animals specified in The Scotland River Basin District (Standards) Directions 2014. |

**Table A2.11: Identification of significant pressures on bodies of surface water continued**

| **Type of pressure** | **Sources of information collected and held on the location and magnitude of pressure** | **Assessment of the effect of pressures** (including cumulatively) | **Assessment of the significance of pressures** (including cumulatively) |
|---|---|---|---|
| Diffuse source pollution | • Land use data combined with loading estimates for different land uses based on national research programme results;<br>• Surveys of land management practices;<br>• National pesticide usage surveys. | Environmental monitoring of pollutant concentrations supplemented by water quality modelling and trend analyses. | Application of the relevant standards for physicochemical conditions and water plants and animals specified in The Scotland River Basin District (Standards) Directions 2014. |
| Water abstraction and flow regulation | • Location and rate of permitted abstractions specified in the authorisations for all abstractions of > $10m^3$ per day;<br>• Actual rate of abstraction supplied by operators of large abstractions as a condition of authorisation;<br>• Location and operating requirements specified in authorisations required for all impounding works;<br>• Audits of compliance with authorisation conditions by regulators;<br>• Location of abstractions of less than $10m^3$ per day for private supplies. | Water flow and level modelling, taking account of information on the location and rates of abstraction, the results of rainfall and water flow and level monitoring – this includes information from the network of river flow gauging stations maintained by SEPA. | Application of the relevant standards for flows and levels and water plants and animals specified in The Scotland River Basin District (Standards) Directions 2014. |
| Modifications to physical condition | • Remote sensing surveys;<br>• Field surveys;<br>• Details specified in authorisations for all modifications that have been made between 2005 and 2015;<br>• Audits of compliance with authorisation conditions by regulators. | Use of the information collected on all modifications to determine morphological condition values for each water body in accordance with the method set out in The Scotland River Basin District (Standards) Directions 2014. | Application of the standards for morphological condition specified in The Scotland River Basin District (Standards) Directions 2014. |

**Table A2.11: Identification of significant pressures on bodies of surface water continued**

| **Type of pressure** | **Sources of information collected and held on the location and magnitude of pressure** | **Assessment of the effect of pressures** (including cumulatively) | **Assessment of the significance of pressures** (including cumulatively) |
|---|---|---|---|
| Barriers to fish migration | • Location of authorised weirs and dams lacking provision for fish migration;<br>• Audits of compliance with authorisation conditions by regulators;<br>• Identification of other structures based on assessments by public bodies and by members of the Rivers and Fishery Trusts of Scotland. | Assessment of the pass-ability of the structures to fish using national guidance /fish monitoring results. | Application of the standards for river continuity/fish specified in The Scotland River Basin District (Standards) Directions 2014. |
| Invasive non-native species | • Public body environmental monitoring programmes and surveys;<br>• Information collected by voluntary organisations, research institutes. | Risk assessments undertaken by the Great Britain Non-Native Species Secretariat Environmental monitoring programmes and surveys. | Application of the criteria specified in The Scotland River Basin District (Status) Directions 2014. |

**Note to table A2.11:**

1. References to authorisations mean the authorisations required under the controls identified in our programmes of measures (see Appendix 8).
2. Further information on authorisation requirements and compliance assessment for the main controls is available on SEPA's website and on the Scottish Government's website.
3. The environmental standards, including the biological standards, used to assess whether pressures are significant were reviewed and updated during the period 2009 to 2015.
4. Information on land use patterns (e.g. see Scotland's environment web; Land capability classification for agriculture; etc.) has been taken into account in assessments in various ways, including in estimating diffuse pollution pressures and identifying where pressures are likely to increase as a result of demographic changes or shifts in land use management practices.

**Table A2.12: Assessment of impact on bodies of surface water**

| **1. Identification of water bodies that are not at good status** | |
|---|---|
| **Approach** | **Further details** |
| (a) We established and applied a framework of criteria and procedures to assess and classify the condition of all water bodies of surface water. | The Scotland River Basin District (Status) Directions 2014 |
| (b) We established a set of environmental standards and associated assessment methods for application within the classification framework. | **Environmental standards**<br>Scotland River Basin District (Standards) Directions 2014 |
| | **Assessment methods**<br>Biological assessment methods;<br>Chemical assessment methods |
| (c) We applied the framework to the results of environmental monitoring and modelling to classify the condition of all bodies of surface water and identify those that are not in a good condition. | Results for each water body are available on the **Water environment hub** |
| **2. Identification of risks of deterioration** | |
| (d) Analysis of monitoring data to identify any trends in the concentration of pollutants that, if unaddressed could breach an environmental standard.<br><br>(e) Analysis of proximity of water bodies to established populations of invasive non-native species and the associated risk of invasion if the spread of the species is not prevented. | Information on water bodies identified as at risk is available on the **Water environment hub** |

**Table A2.13: Characterisation of groundwaters**

| **1. Location and boundaries of bodies of groundwater** | | | |
|---|---|---|---|
| **Outcome of review**<br>For the second plan, we reviewed and substantially revised the location and boundaries of bodies of groundwater to take account of our latest understanding of the characteristics of groundwater. The revisions resulted in an increase in the number of bodies of groundwater in the district from 284 to 344.<br><br>Information on the location and boundaries of the bodies of groundwater is available on the **Water environment hub**. | | | |
| **Summary of approach** | **Aquifer type** | | **Number of bodies of groundwater** |
| The revised boundaries were identified by:<br>• assigning groundwater to aquifer types reflective of groundwater flow characteristics and natural chemistry;<br>• sub-dividing individual aquifers further (i.e. into more than one water body) where necessary to reflect differences in pressure on, or vulnerability of, different parts of the aquifers. Where aquifers were subdivided, the boundaries of the resulting water bodies follow surface water catchment boundaries or geological and structural features, such as faults and folds.<br><br>The approach included separation of bodies of groundwater into two layers: a shallow layer of superficial water bodies and a thicker layer of bedrock water bodies.<br><br>Further information on the approach is available in, Scotland's aquifers and groundwater bodies published by the British Geological Society | All | | 344 |
| | Bedrock | Permo-Triassic | 3 |
| | | Carboniferous – not extensively mined for coal | 32 |
| | | Carboniferous – extensively mined for coal | 31 |
| | | Old Red Sandstone North | 38 |
| | | Old Red Sandstone South | 31 |
| | | Silurian-Ordovician | 5 |
| | | Highland calcareous | 10 |
| | | Precambrian North | 26 |
| | | Precambrian South | 31 |
| | | Igneous volcanic | 28 |
| | | Igneous intrusive | 2 |
| | | Igneous/sedimentary | 8 |
| | | Shetland low permeability | 11 |
| | | Ayrshire basic | 1 |
| | Superficial | Quaternary, buried quaternary or weathered bedrock | 87 |

**Table A2.13: Characterisation of groundwaters continued**

| **2. Information on the characteristics of bodies of groundwater, including the pressures to which they are subject** | |
|---|---|
| **Outcome of review**<br>For the second plan we have improved our understanding of the natural characteristics of bodies of groundwater and the pressures to which they are subject. | |
| **Characteristic** | **Source of information** |
| Geological characteristics (aquifer type) | Scotland's aquifers and groundwater bodies |
| Hydrological characteristics | Scotland's aquifers and groundwater bodies |
| Natural chemistry | Scotland's aquifers and groundwater bodies |
| Annual recharge | **Water environment hub** |
| Overlying strata (and vulnerability to pollution) | **Water environment hub** |
| Dependent surface water bodies and wetlands | **Water environment hub** |
| Pressures to which groundwater body is subject | • Information is maintained by SEPA on the location and rates of abstraction of groundwater in copies of the authorisations required for all abstractions of 10m$^3$ per day or more.<br>• Diffuse sources of pollution have been identified using information on land use, the characteristics of the overlying strata and groundwater monitoring results.<br>• Pollutant inputs from sources in contaminated ground have been identified using information on past land uses, surveys of land quality and groundwater monitoring.<br>• Legacy impacts from abandoned underground mines have been identified using information from environmental monitoring programmes.<br>• Information on all pressures contributing to a body of groundwater being in poor status or to a significant and sustained upward trend in pollutant concentrations is available on the **Water environment hub.** |
| Connection to surface waters | The flow between groundwater and surface waters is taken into account in low flow models for associated bodies of surface water. |

**Table A2.14 - Assessment of impact on bodies of groundwater**

| **1. Identification of water bodies in a poor condition** | |
|---|---|
| **Approach** | **Further details** |
| (a) We established and applied a framework of criteria and procedures to assess and classify the condition of all bodies of groundwater. | The Scotland River Basin District (Status) Directions 2014 |
| (b) We established a set of threshold values for use in helping to identify bodies of groundwater that may be at poor status.<br>We reviewed and updated the threshold values during the period 2009 to 2015. | Threshold values<br>Scotland River Basin District (Standards) Directions 2014 |
| (c) We identified where the threshold values were exceeded using the results of monitoring and modelling.<br>(d) Where we identified that a threshold value was exceeded, we carried out investigations and applied the criteria in the classification framework to determine whether the water body was in a good or poor condition. | In 2015, 74 bodies of groundwater in the district were identified as being in a poor condition. Further details for each water body are available on the **Water environment hub** |
| **2. Identification of risks of deterioration** | |
| (e) We analysed monitoring data from bodies of groundwater to identify any significant and sustained upward trends in the concentration of pollutants in groundwater. | In 2015, we identified a significant and sustained upward trend in six bodies of groundwater. Further information on the water bodies concerned is available on the **Water environment hub** |

## Economic analysis of water use

This part of the appendix provides a summary of our economic analysis of water use.

**Table A2.15: Information to make the calculations necessary for recovering the costs of water services**

Scottish Water:

- provides water-supply services (abstraction, impoundment, storage, treatment and distribution of surface water and groundwater) to household customers;
- provides waste water services (waste water collection and treatment facilities discharging into rivers, lochs, estuaries or coastal waters) to household customers;
- acts as the wholesaler of water supply and waste water services in the competitive market for businesses, public sector bodies and not-for-profit organisations.

Scottish Water is a publicly-owned business with over five million customers in nearly 2.5 million households across Scotland.

To maintain and improve water services, Scottish Ministers have established an investment programme funded by customer charges, known as the Quality and Standards (Q&S) programme. The objectives of the programme are set by Scottish Ministers following public consultation. Scottish Water is responsible for achieving the objectives of the programme. Before the programme is finalised:

- Scottish Water assesses what it needs to do to meet the objectives and how much this would cost;
- The Water Industry Commission for Scotland scrutinises Scottish Water's assessments, including the scope of the solutions considered and the efficiency with which Scottish Water proposes to deliver them. The Water Industry Commission for Scotland is the independent economic regulator of water and sewerage services in Scotland.

The cost of maintaining water services includes the cost of protecting the water environment. The cost of improving water services includes the cost of reducing the adverse impacts of water services on the water environment in order to achieve the objectives of this river basin management plan.

The estimated costs of water services for the period 2015 to 2021are published in the Scottish Water delivery plan.

**Information to calculate the cost of maintaining water services**

- For the investment programme for the period, 2015 to 2021, Scottish Water estimated maintenance costs using asset (i.e. treatment works, pumping stations, sewers, water pipes, etc.) management modelling techniques and detailed assessments.
- The models and assessments took account of projected future demand for water services.

**Information to calculate the cost of improving water services**
To collect sufficient information to calculate the cost of improving water services in the period 2015 to 2021:

- SEPA and Scottish Water worked together during the period 2009 to 2015 to quantify the contribution made by water services to adverse impacts on the water environment relative to the contributions from other pressures on the water environment, such as rural diffuse pollution.

- During the same period, Scottish Water estimated the cost of addressing the contributions of water services to achieve the objectives set for the water environment in the period 2015 to 2021. This involved undertaking detailed studies to identify the most cost-effective options for addressing the impacts of water services.

- The studies included consideration of long-term forecasts of supply and demand to ensure the lowest cost whole-life solutions were identified.

- During the period 2015 to 2021, Scottish Water will complete the studies necessary to identify the most cost-effective solutions for making the improvements required to achieve the objectives we have set for 2027.

**Information on users of water services necessary for making the calculations necessary for recovering costs**

- Public water supply to business premises is metered.
- Scottish Water estimates that, for households, the average daily water usage per person is 150 litres.

All significant trade effluent discharges to Scottish Water's network of waste water collection sewers require authorisation from Scottish Water under the Sewerage (Scotland) Act. The authorisations set limits on the volume and nature of the discharges.

**Table A2.16: Information to make judgements about the most cost effective combination of measures included in the programme of measures**

The principal controls on water uses included in the programme of measures have been specifically designed to enable the cost-effective protection and improvement of the water environment.

**Cost-effective protection**

The controls cover any water use posing a risk to the water environment and their tiered, risk-proportionate structure ensures that:

- activities posing the greatest risk are identified by the regulator and subject to a commensurate level of regulatory control - in terms of both conditions of authorisation and scrutiny;
- cumulative risks from concentrations of individually lower risk activities are identified by the regulator and appropriately addressed;
- unnecessary regulatory burdens on businesses are avoided.

The water uses covered include:

- any activity liable to cause pollution, including those resulting in diffuse sources of pollution;
- water abstraction;
- the construction, alteration and operation of impounding works;
- any other building or engineering works in the water environment or in the vicinity of the water environment and likely to have a significant adverse impact on it;
- the direct or indirect discharges into groundwater of any pollutant;
- any other activity which directly or indirectly is likely to have a significant adverse impact on the water environment.

**Cost-effective improvement**

The comprehensive range of water uses subject to control enables the regulator to:

- target problems effectively, taking account of the interaction between pressures; the most appropriate sequencing of action to address them; and opportunities for maximising wider social and economic benefits;
- ensure equitable and proportionate contributions are made by those responsible for the water uses concerned.

Once the required contribution has been identified by the regulator, the controls are designed and operated to allow the businesses responsible to use their expertise and innovation to identify the most cost-effective options for making their contributions.

Where the business concerned is Scottish Water, the economic regulator scrutinises its assessments (see table A2.15 above). For other businesses, the environmental regulator scrutinises the assessments where the business believes that there are no feasible or proportionate options for adequately addressing the impact.

**Information used in making the judgements required**

| | |
|---|---|
| Impact on the water body, the pressures responsible, and the scale of improvement required. | • See Part 1 and Part 3 of this appendix;<br>• Summarised in **Water environment hub** (impacts and pressures responsible). |
| Businesses/sectors responsible for the pressures. | • Authorisation information;<br>• Land use data;<br>• Investigations;<br>• Summarised in **Water environment hub** (business sectors responsible for pressures). |
| Where there are multiple contributions to an impact, the proportion of the impact attributable to each. | • Environmental modelling, including source apportionment modelling;<br>• Source investigations. |
| Opportunities for maximising wider benefits. | • National and local plans, including flood risk management plans;<br>• Local consultations;<br>• Benefit assessments, such as ecosystem services assessments. |
| Measure options. | • Option appraisal studies;<br>• Advice, guidance and other expertise sharing. For examples, see Appendix 8. |

## Monitoring and classification

This part of the appendix, together with the information referred to on the **Water environment hub**, provides information on our monitoring programmes and on how we assess and classify the condition of the water environment.

**Table A2.17: Establishment and implementation of monitoring programmes**

| | |
|---|---|
| Establishment of programmes of monitoring. | Water Environment and water Services (Scotland) Act 2003 |
| Content of the programmes. | The Water Environment (River Basin Management Planning: Further Provision) (Scotland) Regulations 2013 |
| Responsibility for preparing programmes. | SEPA |
| Responsibility for carrying out or securing the carrying out of the programmes. | SEPA |
| Date which programmes first commenced. | 22 December 2006 |
| Contact point for obtaining monitoring data gathered through the monitoring programmes.<br>For information on the procedures for doing so, see Appendix 1. | SEPA |

**Table A2.18: Monitoring networks**

The initial monitoring programmes for the purposes of the river basin management plan were established at the end of 2006.

Information on the establishment of the programmes was published in an aquatic monitoring strategy for the district.

The programmes are designed on the basis of:

- assessments of risk to our objectives for the water environment. These assessments take account of the results of monitoring programmes and analyses of information on pressures (see Part 1 of this appendix);
- information on when and where measures are being taken for the purposes of improving the condition of the water environment;
- reports of accidental pollution.

The initial programmes have been reviewed and updated on an annual basis accordingly.

The programmes will be comprehensively reviewed during the period 2015 to 2021. In particular, the review will ensure the programmes monitor the effectiveness of the measures taken under this plan to improve the condition of water bodies and protected areas.

| Water category | Type of programme | Main purposes of programme | | Maps of monitoring networks |
|---|---|---|---|---|
| Surface waters and groundwater | Surveillance | • Supplementing and validating impact assessments and informing the design of future monitoring programmes;<br>• Assessing long-term changes, including those resulting from widespread human activities. | During the period 2009 to 2015, we:<br>• developed improved models of the impact of point and diffuse source pollution on river water quality;<br>• established the status of water bodies across the district.<br><br>During the period 2015 to 2021, we will amend the monitoring network to shift effort from water bodies where we have established status to:<br>• supplementing and validating the outputs of our water quality models;<br>• identifying and assessing emerging risks | **Water environment hub** |

**Table A2.18: Monitoring networks continued**

| Water category | Type of programme | Main purposes of programme | Summary of action planned for 2015-2021 | Maps of monitoring networks |
|---|---|---|---|---|
| Surface waters and groundwater | Operational | • assessing the condition of water bodies that are under pressure;<br>• assessing changes resulting from actions taken to improve or protect the condition of water bodies;<br>• establish the presence of any long-term trends in the concentration of pollutants. | We will amend the network during the period 2015 to 2021 in order to:<br>• assess changes resulting from the programme of measures established in this plan;<br>• improve understanding of the impacts of pressures (see Appendix 5). | **Water environment hub** |
| | Investigative | • identifying the cause of impacts where these are not known;<br>• ascertaining the magnitude and impacts of accidental pollution;<br>• improving understanding of the impacts of pressures. | Where appropriate, we will use investigative monitoring during the period 2015 to 2021 to help improve our understanding of pressure and impacts - including in particular the improvements highlighted as needed in Appendix 5. | Dynamic and highly variable and hence not mapped. |
| Groundwater | Level monitoring | • assessing the quantitative status of bodies of groundwater;<br>• identifying the available groundwater resource | We will amend the network during the period 2015 to 2021 in order to assess changes resulting from the programme of measures established in this plan | **Water environment hub** |

**Table A2.18: Monitoring networks continued**

| Water category | Type of programme | Main purposes of programme | Summary of action planned for 2015-2021 | Maps of monitoring networks |
|---|---|---|---|---|
| Protected areas | Specific programmes for protected areas are designed. These are integrated with the monitoring programmes outlined above wherever possible. Monitoring of wildlife protected areas that are at risk of not achieving their objectives is included in the operational monitoring programmes for the water bodies concerned. | • assessing the condition of protected areas;<br>• identifying risks to the achievement of the protected areas objectives;<br>• assessing the effectiveness of the measures taken to achieve the objectives for the areas. | We will amend the network during the period 2015 to 2021 in order to assess changes resulting from the programme of measures established in this plan. | **Water environment hub** |

**Table A2.19: Assessment of the condition of the water environment**

| An overview of our approach to assessing the condition of the water environment is set out in *Assessing Scotland's water environment – use of environmental standards, condition limits and classification schemes* | | | | |
|---|---|---|---|---|
| **Condition** | **Assessment framework** | **Environmental standards or threshold values applied** | **Map of the results of monitoring programmes** | **Detailed results per water body, including level of confidence in results** |
| Surface waters - ecological status | The Scotland River Basin District (Status) Directions 2014;<br><br>Specifications for chemical analysis and monitoring: The Chemical Analysis of Water Status (Technical Specifications) (Scotland) (N0. 2) Directions 2011 | Scotland River Basin District (Standards) Directions 2014 | **Water environment hub** | **Water environment hub** |

**Table A2.19: Assessment of the condition of the water environment continued**

| Condition | Assessment framework | Environmental standards or threshold values applied | Map of the results of monitoring programmes | Detailed results per water body, including level of confidence in results |
|---|---|---|---|---|
| Surface waters – ecological potential | See appendix 3;<br><br>Specifications for chemical analysis and monitoring:<br>The Chemical Analysis of Water Status (Technical Specifications) (Scotland) (N0. 2) Directions 2011 | See appendix 3 | **Water environment hub** | **Water environment hub** |
| Surface water bodies that are not in good status or good potential because of the concentration of a specific pollutant. | The Scotland River Basin District (Status) Directions 2014;<br><br>Specifications for chemical analysis and monitoring:<br>The Chemical Analysis of Water Status (Technical Specifications) (Scotland) (N0. 2) Directions 2011 | Scotland River Basin District (Standards) Directions 2014 | **Water environment hub** | **Water environment hub** |
| Surface waters - chemical status | The Scotland River Basin District (Status) Directions 2014;<br><br>Specifications for chemical analysis and monitoring:<br>The Chemical Analysis of Water Status (Technical Specifications) (Scotland) (N0. 2) Directions 2011 | Scotland River Basin District (Standards) Directions 2014 | **Water environment hub** | **Water environment hub** |

**Table A2.19: Assessment of the condition of the water environment continued**

| Condition | Assessment framework | Environmental standards or threshold values applied | Map of the results of monitoring programmes | Detailed results per water body, including level of confidence in results |
|---|---|---|---|---|
| Groundwater – quantitative status | The Scotland River Basin District (Status) Directions 2014 | Scotland River Basin District (Standards) Directions 2014 | **Water environment hub** | **Water environment hub** |
| Groundwater – chemical status | The Scotland River Basin District (Status) Directions 2014 | Scotland River Basin District (Standards) Directions 2014 | **Water environment hub** | **Water environment hub** |
| Long-term trends in concentration of priority substances | The water Environment (River Basin Management Planning: Further Provision) (Scotland) Regulations 2013;<br><br>Specifications for chemical analysis and monitoring:<br>The Chemical Analysis of Water Status (Technical Specifications) (Scotland) (N0. 2) Directions 2011 | Scotland River Basin District (Standards) Directions 2014 | No trends identified by 2015. A longer period of monitoring may be required to identify any trends. | |
| Groundwater – trends in pollutant concentrations | The Water Environment (River Basin Management Planning: Further Provision) (Scotland) Regulations 2013 | The starting point for trend reversal is where concentrations reach 75% of any threshold values established in the Scotland River Basin District (Standards) Directions 2014 | **Water environment hub** | **Water environment hub** |
| Achievement of protected areas objectives | See appendix 4 | See appendix 4 | **Water environment hub** | **Water environment hub** |

**Table A2.20: Information on methodologies used for monitoring the impact of pressures on rivers**

| Pressure | | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|---|
| Pressures on water quality - pollution | Nutrient enrichment | Larger rooted or floating plants (macrophytes) | River Assessment Method, Macrophytes and Phytobenthos, Phytobenthos – Diatoms for Assessing River and Lake Ecological Quality (River DARLEQ2) |
| | | Small, bottom-living algae (phytobenthos) | River Assessment Method, Macrophytes and Phytobenthos, Phytobenthos – Diatoms for Assessing River and Lake Ecological Quality (River DARLEQ2) |
| | | Reactive phosphorus concentrations | Scotland River Basin District (Standards) Directions 2014 |
| | Organic enrichment | Bottom-living invertebrate animals | River Assessment Method, Benthic Invertebrate Fauna, Invertebrates (General Degradation): Whalley, Hawkes, Paisley & Trigg (WHPT) metric in River Invertebrate Classification Tool (RICT) |
| | | Bacterial tufts | River Assessment Method, Macrophytes and Phytobenthos, Phytobenthos – Diatoms for Assessing River and Lake Ecological Quality (River DARLEQ2) |
| | | Dissolved oxygen concentrations<br>Biochemical oxygen demand | Scotland River Basin District (Standards) Directions 2014 |
| | Acid deposition | Bottom-living invertebrate animals | River Assessment Method, Benthic Invertebrate Fauna, Invertebrates (Anthropogenic Acidification): WFD Acid Water Indicator Community (WFD-AWIC)) |
| | | Fish | River Assessment Method, Fish Fauna, Fisheries Classification Scheme 2 (FCS2) Scotland |
| | | pH and acid neutralising capacity | Scotland River Basin District (Standards) Directions 2014 |
| | Thermal discharges | Fish | River Assessment Method, Fish Fauna, Fisheries Classification Scheme 2 (FCS2) Scotland |
| | | Water temperature | Scotland River Basin District (Standards) Directions 2014 |

**Table A2.20: Information on methodologies used for monitoring the impact of pressures on rivers continued**

| Pressure | | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|---|
| Pressures on water quality - pollution | Point and diffuse inputs of toxic pollutants | Bottom-living invertebrate animals | River Assessment Method, Benthic Invertebrate Fauna, Invertebrates (General Degradation): Whalley, Hawkes, Paisley & Trigg (WHPT) metric in River Invertebrate Classification Tool (RICT) |
| | | Concentrations of specific pollutants and priority substances | Scotland River Basin District (Standards) Directions 2014 |
| Modifications to physical condition | | Morphological condition | Scotland River Basin District (Standards) Directions 2014 |
| | | Fish | River Assessment Method, Fish Fauna, Fisheries Classification Scheme 2 (FCS2) Scotland |
| Barriers to fish migration | | River continuity condition | Scotland River Basin District (Standards) Directions 2014 |
| | | Fish | River Assessment Method, Fish Fauna, Fisheries Classification Scheme 2 (FCS2) Scotland |
| Water abstraction and impoundment | | River flows | Scotland River Basin District (Standards) Directions 2014 |
| | | Ecological indicators | River Assessment Method, Ecological indicators of severe water resources pressures |
| Invasive non-native species | | Invasive species | The Scotland River Basin District (Status) Directions 2014 |
| | | Other biological assessment methods listed above, as appropriate | |

**Table A2.21: Information on methodologies used for monitoring the impact of pressures on freshwater lochs**

| Pressure | | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|---|
| Pressures on water quality - pollution | Nutrient enrichment | Microscopic plants in the water column (phytoplankton) | Lake Assessment Method, Phytoplankton, Phytoplankton Lake Assessment Tool with Uncertainty Module (PLUTO) |
| | | Larger rooted or floating plants (macrophytes) | Lake Assessment Method, Macrophytes and Phytobenthos, Macrophytes (Lake LEAFPACS2) |
| | | Small, bottom-living algae (phytobenthos) | Lake Assessment Method, Macrophytes and Phytobenthos, Phytobenthos – Diatoms for Assessing River and Lake Ecological Quality (River DARLEQ2) |
| | | Bottom-living invertebrate animals | Lake Assessment Method, Benthic Invertebrate Fauna, Chironomid Pupal Exuviae Technique (CPET) |
| | | Concentrations of total phosphorus | Scotland River Basin District (Standards) Directions 2014 |
| | | Dissolved oxygen concentrations | Scotland River Basin District (Standards) Directions 2014 |
| | Acid deposition | Bottom-living invertebrate animals | Lake Assessment Method, Benthic Invertebrate Fauna, Lake Acidification Macroinvertebrate Metric (LAMM) |
| | | Acid neutralising capacity | Scotland River Basin District (Standards) Directions 2014 |
| | Point and diffuse inputs of toxic pollutants | Concentrations of specific pollutants and priority substances | Scotland River Basin District (Standards) Directions 2014 |
| Modifications to physical condition | | Morphological condition | Scotland River Basin District (Standards) Directions 2014 |
| | | Larger rooted or floating plants (macrophytes) | Lake Assessment Method, Macrophytes and Phytobenthos, Macrophytes (Lake LEAFPACS2) |

**Table A2.21: Information on methodologies used for monitoring the impact of pressures on freshwater lochs continued**

| Pressure | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|
| Water abstraction and impoundment | Water levels | Scotland River Basin District (Standards) Directions 2014 |
| | Morphological condition | Scotland River Basin District (Standards) Directions 2014 |
| | Larger rooted or floating plants (macrophytes) | Lake Assessment Method, Macrophytes and Phytobenthos, Macrophytes (Lake LEAFPACS2) |
| Invasive non-native species | Invasive species | The Scotland River Basin District (Status) Directions 2014 |
| | Other biological assessment methods listed above, as appropriate. | |

**Table A2.22: Information on methodologies used for monitoring the impact of pressures on estuaries**

| Pressure | | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|---|
| Pressures on water quality - pollution | Nutrient enrichment | Microscopic plants in the water column (phytoplankton) | Transitional Water Assessment Method, Phytoplankton, Transitional Water Phytoplankton Tool |
| | | Seaweeds (macroalgae) | Transitional and Coastal Water Assessment Method, Macroalgae, Opportunistic Macroalgal Blooming Tool |
| | | Seagrasses (angiosperms) | Transitional and Coastal Water Assessment Method, Angiosperms, Intertidal Seagrass Tool |
| | | Concentrations of inorganic nitrogen | Scotland River Basin District (Standards) Directions 2014 |
| | | Concentration of dissolved oxygen | Scotland River Basin District (Standards) Directions 2014 |
| | Organic enrichment | Bottom-living invertebrate animals | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate Fauna, Infaunal Quality Index |
| | | Concentration of dissolved oxygen | Scotland River Basin District (Standards) Directions 2014 |

**Table A2.22: Information on methodologies used for monitoring the impact of pressures on estuaries continued**

| Pressure | | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|---|
| Pressures on water quality - pollution | Point and diffuse inputs of toxic pollutants | Concentrations of specific pollutants and priority substances | Scotland River Basin District (Standards) Directions 2014 |
| | | Bottom-living invertebrate animals | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate Fauna, Infaunal Quality Index |
| | | Seaweeds (macroalgae) | Transitional Water Assessment Method, Macroalgae, Fucoid Extent Tool |
| Physical condition, including tidal regime and freshwater flow | | Morphological condition | Scotland River Basin District (Standards) Directions 2014 |
| | | Freshwater flow condition | Scotland River Basin District (Standards) Directions 2014 |
| | | Bottom-living invertebrate animals | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate Fauna, Infaunal Quality Index |
| | | Seagrasses (angiosperms) | Transitional and Coastal Water Assessment Method, Angiosperms, Intertidal Seagrass Tool |
| | | Fish | Transitional Water Assessment Method, Fish Fauna, Transitional Fish Classification Index |
| Invasive non-native species | | Invasive species | The Scotland River Basin District (Status) Directions 2014 |
| | | Other biological assessment methods listed above, as appropriate | |

**Table A2.23: Information on methodologies used for monitoring the impact of pressures on coastal waters**

| Pressure | | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|---|
| Pressures on water quality - pollution | Nutrient enrichment | Microscopic plants in the water column (phytoplankton) | Coastal Water Assessment Method, Phytoplankton, Coastal Water Phytoplankton Tool |
| | | Seaweeds (macroalgae) | Transitional and Coastal Water Assessment Method, Macroalgae, Opportunistic Macroalgal Blooming Tool |
| | | | Coastal Water Assessment Method, Macroalgae, Macroalgae - Intertidal Rocky Shore Macroalgal Index |
| | | Seagrasses (angiosperms) | Transitional and Coastal Water Assessment Method, Angiosperms, Intertidal Seagrass Tool |
| | | Concentrations of inorganic nitrogen | Scotland River Basin District (Standards) Directions 2014 |
| | | Concentration of dissolved oxygen | Scotland River Basin District (Standards) Directions 2014 |
| | Organic enrichment | Bottom-living invertebrate animals | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate Fauna, Infaunal Quality Index |
| | | Concentration of dissolved oxygen | Scotland River Basin District (Standards) Directions 2014 |
| | Point and diffuse inputs of toxic pollutants | Concentrations of specific pollutants and priority substances | Scotland River Basin District (Standards) Directions 2014 |
| | | Bottom-living invertebrate animals | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate Fauna, Infaunal Quality Index |
| | | | Coastal Water Assessment Method, Benthic Invertebrate Fauna, Assessment of Imposex in Nucella Lapillus (Dog Whelks) |

**Table A2.23: Information on methodologies used for monitoring the impact of pressures on coastal waters continued**

| Pressure | Principal indicators of impact used | Method used, including, where applicable, information on the taxonomic level required and the calculation of confidence |
|---|---|---|
| Physical condition, including tidal regime | Morphological condition | Scotland River Basin District (Standards) Directions 2014 |
| | Bottom-living invertebrate animals | Transitional and Coastal Water Assessment Methods, Benthic Invertebrate Fauna, Infaunal Quality Index |
| | Seagrasses (angiosperms) | Transitional and Coastal Water Assessment Method, Angiosperms, Intertidal Seagrass Tool |
| Invasive non-native species | Invasive species | The Scotland River Basin District (Status) Directions 2014 |
| | Other biological assessment methods listed above, as appropriate. | |

**Table A2.24: Threshold values for assessing groundwater chemical status – 1**

The threshold values set out in this table and table A2.26 are established in the Scotland River Basin District (Standards) Directions 2014

The changes and additions made to the threshold values during the period 2009 to 2015 are described in Updated recommendations on Environmental Standards, River Basin Management (2015 to 2021), published by the UK Technical Advisory Group on the Water Framework Directive.

| Pollutant or indicator of pollution | Unit of measurement and associated assessment statistic | Risk indicated by a failure of the threshold value | | | |
|---|---|---|---|---|---|
| | | Threshold values indicative of risks to the ecological or chemical quality of an associated surface water | Threshold values indicative of risks to the quality of water being abstracted, or intended to be abstracted, for human consumption[(i)] | Threshold values indicative of risks of saline intrusion | Threshold values indicative of other significant environmental risks including those affecting the ability of groundwater to support human uses |
| Electrical conductivity | Mean conductivity (micro-Siemens/cm) | | | 1,000 | 1,000[(ii)] |
| Atrazine | Mean concentration (µg/l) | | 0.075 | | 0.075 |
| Benzo(a)pyrene | Mean concentration (µg/l) | | | | 0.0075 |
| Chromium (total) | Mean concentration (µg/l) | | | | 37.5 |
| Dichloromethane | Mean concentration (µg/l) | | | | 1.5 |
| Epoxyconazole | Mean concentration (µg/l) | | | | 0.075 |
| Mecoprop | Mean concentration (µg/l) | | | | 0.075 |
| Nitrate | Mean concentration (mg/l) | 18[(ii)] | 37.5 | | 37.5 |
| Simazine | Mean concentration (µg/l) | | | | 0.075 |
| Tetrachloroethene | Mean concentration (µg/l) | | | | 7.5 |
| Tricholoethane | Mean concentration (µg/l) | | | | 7.5 |

**Table A2.24: Threshold values for assessing groundwater chemical status – 1 continued**

| Pollutant or indicator of pollution | Unit of measurement and associated assessment statistic | Risk indicated by a failure of the threshold value | | | |
|---|---|---|---|---|---|
| | | **Threshold values indicative of risks to the ecological or chemical quality of an associated surface water** | **Threshold values indicative of risks to the quality of water being abstracted, or intended to be abstracted, for human consumption[(i)]** | **Threshold values indicative of risks of saline intrusion** | **Threshold values indicative of other significant environmental risks including those affecting the ability of groundwater to support human uses** |
| Any other pollutant | As specified in Part C of Schedule 2 of the Scotland River Basin District (Standards) Directions 2014 for the relevant chemical standard for the pollutant in the applicable surface water. | Breach of a chemical environ-mental standard for the pollutant in an associated surface water. | | | |
| | Mean concentration (µg/l) | | | | 0.75 x maximum admissible concentration for the relevant drinking water standard[(iv)] |

**Note for table A2.24:**

(i) For the purpose of assessing risks to the quality of water being abstracted, or intended to be abstracted, for human consumption, the relevant thresholds apply to groundwater representative of the quality of the water being abstracted or intended to be abstracted.

(ii) For the purpose of assessing other significant risks, the relevant electrical conductivity threshold value must be applied for the purposes of assessing the impact of mining on the chemical status of bodies of groundwater.

(iii) For the purposes of assessing risks to the ecological or chemical quality of associated surface waters, the relevant threshold value for nitrate is applicable only where there is an associated failure of a nitrogen-related standard in an associated surface water.

(iv) This includes relevant standards set under the Water Supply (Water Quality) (Scotland) Regulations 2001 and the Private Water Supplies (Scotland) Regulations 2006 (as amended or re-enacted from time to time).

**Table A2.25: Threshold values for assessing groundwater chemical status – 2**

| Pollutant or indicator of pollution | Unit of measurement and associated assessment statistic | Groundwater dependent wetland type | Threshold values indicative of risks to the quality of groundwater dependent wetlands | |
|---|---|---|---|---|
| | | | Altitude of wetland above sea level (metres) | |
| | | | ≤ 175 | > 175 |
| Nitrate | Annual mean concentration (mg/l $NO_3$) in groundwater on which the wetland depends | Quaking bog | 18 | 4 |
| | | Wet woodland | 22 | 9 |
| | | Wet dune | 13 | 13 |
| | | Fen (mesotrophic) and fen meadow | 22 | 9 |
| | | Fen (oligotrophic) and wetland at tufa forming springs | 20 | 4 |
| | | Wet grassland | 26 | 9 |
| | | Wet heath | 13 | 9 |
| | | Peatbog and woodland on peatbog | 9 | 9 |
| | | Wetland directly irrigated by spring or seepage | 9 | 9 |
| | | Swamp (oligotrophic) | 18 | 18 |
| | | Swamp (mesotrophic) and reedbed | 22 | 22 |

**Note for table A2.25:**
For the purpose of groundwater chemical status assessment, the above threshold values apply where:

(i) the wetland concerned is significantly damaged;
(ii) the characteristics of the damage are such that it may be due to nitrate reaching the wetland via groundwater.

For information on wetland types, see the Scotland River Basin District (Standards) Directions 2014.

**Table A2.26: Background information on the establishment of threshold values for assessing groundwater chemical status**

| Background information topic | Where information can be accessed |
|---|---|
| How EU guidelines have been followed in setting threshold values. | Page 6, Section 3 of the Groundwater chemical classification for the purposes of the Water Framework Directive and the Groundwater Directive, published by the UK Technical Advisory Group on the Water Framework Directive. |
| Application of the threshold values. | The values have been established at national level and apply to all bodies of groundwater in the district. |
| The relationship between the threshold values and background levels, other standards for water protection, information on hazardous properties and dispersion tendency. | Annex 1 of the Groundwater chemical classification for the purposes of the Water Framework Directive and the Groundwater Directive, published by the UK Technical Advisory Group on the Water Framework Directive. |
| The number of bodies in poor chemical status. | **Water environment hub** |
| The characteristics of water bodies in poor chemical status. | **Water environment hub**<br>See also Table A2.13 above. |

**Table A2.27: Background information on our method for assessing trends in the concentration of pollutants in groundwater**

| Background information topic | Where information can be accessed |
|---|---|
| How trend assessment from individual monitoring points is used in identifying significant and sustained upward trends in the concentration of any pollutant or reversal of that trend. | Page 4, Section 4 of the Groundwater trend assessment, published by the UK Technical Advisory Group on the Water Framework Directive. |
| The reasons for the starting points defined for trend reversal. | Page 2, Section 2 of the Groundwater trend assessment, published by the UK Technical Advisory Group on the Water Framework Directive. |

**Table A2.28: Information on performance criteria for methods of analysis used in chemical analysis**

| Substance | Substance Type[a] | PS/PHS Number[b] | Environmental quality standard[c] | Media - FW, MW, FW/MW or Biota[d] | Minimum Detection Limit[e] | Limit of Quantification[f] | Unit | Precision (RSD)% | Bias (%) |
|---|---|---|---|---|---|---|---|---|---|
| Alachlor[g] | PS | 1 | 0.3 | FW/MW | | | µg/l | | |
| Anthracene | PHS | 2 | 0.1 | FW/MW | 0.0017 | 0.0051* | µg/l | 5.73 | 3.93 |
| Atrazine | PS | 3 | 0.6 | FW/MW | 0.0028 | 0.0084 | µg/l | 14.36 | 30.31 |
| Benzene | PS | 4 | 10 | FW/MW | 0.06 | 0.18 | µg/l | 6.41 | 2.28 |
| Brominated diphenylethers | PHS | 5 | sum 0.0085 | biota | | | ug/kg | | |
| • PBDE 28 | PHS | 5 | | biota | 0.4 | 1.6* | ug/kg | 26.47 | 5.48 |
| • PBDE 47 | PHS | 5 | | biota | 0.6 | 2.4* | ug/kg | 29.17 | 4.46 |
| • PBDE 99 | PHS | 5 | | biota | 0.5 | 2* | ug/kg | 30.13 | 7.47 |
| • PBDE 100 | PHS | 5 | | biota | 0.4 | 1.6* | ug/kg | 35.43 | 15.12 |
| • PBDE 153 | PHS | 5 | | biota | 0.5 | 2* | ug/kg | 37.36 | 12.59 |
| • PBDE 154 | PHS | 5 | | biota | 0.5 | 2* | ug/kg | 30.23 | 15.86 |
| Cadmium | PHS | 6 | ≤ 0.08 | FW | 0.012 | 0.05 | µg/l | 2.87 | 0.03 |
| Cadmium | PHS | 6 | 0.2 (dissolved) | MW | 0.005 | 0.015* | µg/l | 2.87 | 0.03 |
| Carbon tetrachloride | OP | 6a | 12 | FW/MW | 0.1 | 0.3 | µg/l | 6.09 | 1.85 |
| Chloroalkanes, C10-C13[g] | PHS | 7 | 0.4 | FW/MW | | | µg/l | | |
| Chlorfenvinphos | PS | 8 | 0.1 | FW/MW | 0.0048 | 0.0144 | µg/l | 14.28 | 6.51 |
| Chlorpyrifos | PS | 9 | 0.03 | FW/MW | 0.0021 | 0.0063 | µg/l | 17.61 | 15.02 |
| Cyclodiene pesticides (aldrin, dieldrin, endrin, isodrin) | OP | 9a | sum 0.01 | FW | | | µg/l | | |
| • aldrin[g] | OP | 9a | | FW | | | µg/l | | |
| • dieldrin | OP | 9a | | FW | 0.000004 | 0.000012* | µg/l | 16.19 | 27.93 |
| • endrin[g] | OP | 9a | | FW | | | µg/l | | |
| • isodrin[g] | OP | 9a | | FW | | | µg/l | | |

| Substance | Substance Type[a] | PS/PHS Number[b] | Environmental quality standard[c] | Media - FW, MW, FW/MW or Biota[d] | Minimum Detection Limit[e] | Limit of Quantification[f] | Unit | Precision (RSD)% | Bias (%) |
|---|---|---|---|---|---|---|---|---|---|
| Cyclodiene pesticides (aldrin, dieldrin, endrin, isodrin) | OP | 9a | sum 0.005 | MW | | | µg/l | | |
| • aldrin[g] | OP | 9a | | MW | | | µg/l | | |
| • Dieldrin | OP | 9a | | MW | 0.000004 | 0.000012* | µg/l | 16.19 | 27.93 |
| • endrin[g] | OP | 9a | | MW | | | µg/l | | |
| • isodrin[g] | OP | 9a | | MW | | | µg/l | | |
| DDT (pp_DDT)[g] | OP | 9b | 0.01 | FW/MW | | | µg/l | | |
| DDT (Total)[g] | OP | 9b | 0.025 | FW/MW | | | µg/l | | |
| 1,2-Dichloroethane | PS | 10 | 10 | FW/MW | 0.21 | 0.51 | µg/l | 10.62 | 7.52 |
| Dichloromethane | PS | 11 | 20 | FW/MW | 0.38 | 1.14 | µg/l | 7.54 | 2.26 |
| Di(2-ethylhexyl)-phthalate (DEHP) | PHS | 12 | 1.3 | FW/MW | 0.1587 | 0.39* | µg/l | 8.6 | -0.41 |
| Diuron | PS | 13 | 0.2 | FW/MW | 0.0081 | 0.024 | µg/l | 11.5 | 1.55 |
| Endosulfan[g] | PHS | 14 | 0.005 | FW | | | µg/l | | |
| Endosulfan[g] | PHS | 14 | 0.0005 | MW | | | µg/l | | |
| Fluoranthene | PS | 15 | 0.0063 | FW/MW | 0.0026 | 0.0078* | µg/l | 5.18 | -5.66 |
| Fluoranthene | PS | 15 | 30 | biota | 0.58 | 3.6* | ug/kg | 7.45 | 5.14 |
| Hexachlorobenzene | PHS | 16 | 0.05 (MAC) | FW/MW | 0.0014 | 0.00342 | µg/l | 16.65 | -3.37 |
| Hexachlorobenzene | PHS | 16 | 10 | biota | 1.7 | 6.8* | ug/kg | 15.58 | 37.51 |
| Hexachlorobutadiene | PHS | 17 | 0.6 (MAC) | FW/MW | 0.00108 | 0.00324 | µg/l | 19.18 | -30.49 |
| Hexachlorobutadiene | PHS | 17 | 55 | biota | 3.3 | 13.2* | ug/kg | 25.98 | 63.17 |
| Hexachlorocyclohexane (Lindane) | PHS | 18 | 0.02 | FW | 0.000007 | 0.000021* | µg/l | 13.37 | 10.21 |
| Hexachlorocyclohexane (Lindane) | PHS | 18 | 0.002 | MW | 0.000007 | 0.000021* | µg/l | 13.37 | 10.21 |
| Isoproturon | PS | 19 | 0.3 | FW/MW | 0.0081 | 0.024 | µg/l | 11.73 | 2.37 |
| Lead | PS | 20 | 1.2 (bioavailable) | FW | 0.33 | 0.99 | µg/l | 3.09 | 0.01 |
| Lead | PS | 20 | 1.3 (dissolved) | MW | 0.013 | 0.039* | µg/l | 3.09 | 0.01 |
| Mercury | PHS | 21 | 0.07 (MAC) | FW/MW | 0.0095 | 0.0285* | µg/l | 3.51 | -0.005 |
| Mercury | PHS | 21 | 20 | biota | 0.94 | 3.76* | ug/kg | 3.1 | -9.9 |

| Substance | Substance Type[a] | PS/PHS Number[b] | Environmental quality standard[c] | Media - FW, MW, FW/MW or Biota[d] | Minimum Detection Limit[e] | Limit of Quantification[f] | Unit | Precision (RSD)% | Bias (%) |
|---|---|---|---|---|---|---|---|---|---|
| Naphthalene | PS | 22 | 2 | FW/MW | 0.0183 | 0.055* | µg/l | 11.7 | -15.16 |
| Nickel and its compounds | PS | 23 | 4 (bioavailable) | FW | 0.17 | 0.51 | µg/l | 2.76 | 0.01 |
| Nickel and its compounds | PS | 23 | 8.6 (dissolved) | MW | 0.038 | 0.114* | µg/l | 2.76 | 0.01 |
| Nonylphenol (4-Nonylphenol) | PHS | 24 | 0.3 | FW/MW | 0.0257 | 0.0771* | µg/l | 11.69 | -8.26 |
| Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)) | PS | 25 | 0.1 | FW | 0.0029 | 0.0087 | µg/l | 11.5 | -17.56 |
| Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol)) | PS | 25 | 0.01 | MW | 0.0029 | 0.0087 | µg/l | 11.5 | -17.56 |
| pentachlorobenzene | PHS | 26 | 0.007 | FW | 0.00139 | 0.00417 | µg/l | 12.91 | -7.78 |
| pentachlorobenzene | PHS | 26 | 0.0007 | MW | 0.00139 | 0.00417 | µg/l | 12.91 | -7.78 |
| Pentachlorophenol | PS | 27 | 0.4 | FW/MW | 0.00259 | 0.0148 | µg/l | 8.87 | -1.59 |
| PAH - Benzo(a)pyrene | PHS | 28 | 1.70E-04 | FW/MW | 0.0013 | 0.00005* | µg/l | 13.43 | -4.15 |
| PAH - Benzo(a)pyrene | PHS | 28 | 5 | biota | 0.66 | 2.64* | ug/kg | 11.54 | 2.85 |
| PAH - Benzo(b)fluoranthene | PHS | 28 | 0.017 (MAC) | FW/MW | 0.0011 | 0.0033* | µg/l | 11.77 | -4.99 |
| PAH - Benzo(k)fluoranthene | PHS | 28 | 0.017 (MAC) | FW/MW | 0.0014 | 0.0042* | µg/l | 6.98 | -2.43 |
| PAH - Benzo(g,h,i)perylene | PHS | 28 | 0.0082 (MAC) | FW | 0.0023 | 0.0069* | µg/l | 12 | -9.03 |
| PAH - Benzo(g,h,i)perylene | PHS | 28 | 0.00082 (MAC) | MW | 0.0023 | 0.0069* | µg/l | 12 | -9.03 |
| PAH - Indeno(1,2,3-cd)pyrene | PHS | 28 | n/a | FW | 0.0052 | 0.0156 | µg/l | 13.11 | 6.59 |
| Simazine | PS | 29 | 1 | FW/MW | 0.0021 | 0.0063 | µg/l | 18.68 | 35.44 |
| Tetrachloroethene | PS | 29a | 0.4 | FW/MW | 0.07 | 0.21 | µg/l | 5.01 | 0 |
| Trichloroethylene | PS | 29b | 10 | FW/MW | 0.11 | 0.33 | µg/l | 4.16 | 1.73 |
| Tributyltin compounds[g] | PHS | 30 | 0.0002 | FW/MW | | | µg/l | | |
| 1,3,5-Trichlorobenzene | PS | 31 | 0.4 | FW/MW | 0.0015 | 0.0045 | µg/l | 19.6 | -23.83 |
| 1,2,4-Trichlorobenzene | PS | 31 | 0.4 | FW/MW | 0.00174 | 0.00522 | µg/l | 19.79 | -18.46 |
| 1,2,3-Trichlorobenzene | PS | 31 | 0.4 | FW/MW | 0.00204 | 0.00612 | µg/l | 19.66 | -15.81 |
| Trichloromethane | PS | 32 | 2.5 | FW/MW | 0.14 | 0.42 | µg/l | 5.93 | 5.11 |
| Trifluralin | PHS | 33 | 0.03 | FW/MW | 0.0038 | 0.0114 | µg/l | 15.95 | 39.88 |

| Substance | Substance Type[a] | PS/PHS Number[b] | Environmental quality standard[c] | Media - FW, MW, FW/MW or Biota[d] | Minimum Detection Limit[e] | Limit of Quantification[f] | Unit | Precision (RSD)% | Bias (%) |
|---|---|---|---|---|---|---|---|---|---|
| Dicofol[g] | PS | 34 | 0.0013 | FW | | | µg/l | | |
| Dicofol[g] | PS | 34 | 0.000032 | MW | | | µg/l | | |
| PFOS[g] | PHS | 35 | 7E-04 | FW | | | µg/l | | |
| PFOS[g] | PHS | 35 | 1E-04 | MW | | | µg/l | | |
| PFOS[g] | PHS | 35 | 9.1 | biota | | | ug/kg | | |
| Quinoxyfen[g] | PS | 36 | 0.15 | FW | | | µg/l | | |
| Quinoxyfen[g] | PS | 36 | 0.015 | MW | | | µg/l | | |
| Dioxins[g] | PHS | 37 | Sum of PCDD+PCDF+ PCB-DL 0.0065 | biota | | | $\mu g.kg^{-1}$ TEQ | | |
| Aclonifen[g] | PS | 38 | 0.12 | FW | | | µg/l | | |
| Aclonifen[g] | PS | 38 | 0.012 | MW | | | µg/l | | |
| Bifenox[g] | PHS | 39 | 0.012 | FW/MW | | | µg/l | | |
| Cybutryne | PHS | 40 | 0.0025 | FW | 0.0051 | 0.0153 | µg/l | 16.25 | 33.99 |
| Cybutryne | PHS | 40 | 0.0025 | MW | 0.0051 | 0.0153 | µg/l | 16.25 | 33.99 |
| Cypermethrin | PS | 41 | 8E-05 | FW | 0.0003 | 0.0009* | µg/l | 7.99 | 7.21 |
| Cypermethrin | PS | 41 | 8E-06 | MW | 0.0003 | 0.0009* | µg/l | 7.99 | 7.21 |
| Dichlorvos[g] | PS | 42 | 6E-04 | FW | | | µg/l | | |
| Dichlorvos[g] | PS | 42 | 6E-05 | MW | | | µg/l | | |
| HBCDD[g] | PHS | 43 | 0.0016 | FW | | | µg/l | | |
| HBCDD[g] | PHS | 43 | 0.0008 | MW | | | µg/l | | |
| HBCDD[g] | PHS | 43 | 167 | biota | | | ug/kg | | |
| Heptachlor[g] | PHS | 44 | 2E-07 | FW | | | µg/l | | |
| Heptachlor[g] | PHS | 44 | 1E-08 | MW | | | µg/l | | |
| Heptachlor[g] | PHS | 44 | 0.034 | biota | | | ug/kg | | |
| Terbutryn | PS | 45 | 0.065 | FW/MW | 0.0043 | 0.0129 | µg/l | 16.25 | 33.99 |

| Substance | Substance Type[a] | PS/PHS Number[b] | Environmental quality standard[c] | Media - FW, MW, FW/MW or Biota[d] | Minimum Detection Limit[e] | Limit of Quantification[f] | Unit | Precision (RSD)% | Bias (%) |
|---|---|---|---|---|---|---|---|---|---|
| Cypermethrin | SP | | 0.1 | FW/MW | 0.0003 | 0.0009* | µg/l | 7.99 | 7.21 |
| 2,4-D (2,4-dichlorophenoxyacetic acid) | SP | | 0.3 | FW/MW | 0.002 | 0.006 | µg/l | 10.12 | 2.52 |
| 2,4-dichlorophenol | SP | | 4.2 | FW | 0.00829 | 0.048 | µg/l | 7.13 | 4.09 |
| 2,4-dichlorophenol | SP | | 0.42 | MW | 0.00829 | 0.048 | µg/l | 7.13 | 4.09 |
| 3,4-dichloroaniline[g] | SP | | 0.2 | FW/MW | | | µg/l | | |
| Ammonia | SP | | 0.2 | FW | 0.024 | 0.09* | mg/l NH4 as N | 1.41 | 4.67 |
| Ammonia | SP | | 21 (1.164) | MW | 3.52 (0.195) | 10.83 - 14.45* (0.6 - 0.8*) | ug/l (umol/l) NH4 as N | 8.5 | -15.35 |
| Ammonia | SP | | 0.2 | FW-loch | 0.024 | 0.09* | mg/l NH4 as N | 1.41 | 4.67 |
| Arsenic | SP | | 50 | FW | 0.26 | 1 | µg/l | 2.94 | 0.01 |
| Arsenic | SP | | 25 | MW | 0.26 | 1 | µg/l | 2.94 | 0.01 |
| Benzylbutylphthalate (BBP) | SP | | 7.5 | FW | 0.0245 | 0.0735* | µg/l | 5.68 | -0.47 |
| Benzylbutylphthalate (BBP) | SP | | 0.75 | MW | 0.0245 | 0.0735* | µg/l | 5.68 | -0.47 |
| Chlorothalonil | SP | | 0.035 | FW | 0.0045 | 0.0135 | µg/l | 15.7 | 37.6 |
| Carbendazim[g] | SP | | 0.15 | FW | | | µg/l | | |
| Chromium III[h] | SP | | 4.7 | FW | | | µg/l | | |
| Chromium VI[h] | SP | | 3.4 | FW | | | µg/l | | |
| Chromium VI[h] | SP | | 0.6 | MW | | | µg/l | | |
| Chromium Dissolved & total | | | | FW/MW | 0.21 | 0.45 | µg/l | 3.46 | 0.02 |
| Copper | SP | | 1 | FW | 0.34 | 0.36 | µg/l | 2.58 | 0.01 |
| copper | SP | | 3.76 | MW | 0.34 | 0.36 | µg/l | 2.58 | 0.01 |
| Cyanide[g] | SP | | 1 | FW/MW | | | µg/l | | |
| Chlorine (total available) | SP | | 2 | FW | 1 | 3* | mg/l as Cl | 1.83 | 1.72 |
| Chlorine (total residual) | SP | | 10 | MW | 1 | 3* | mg/l as Cl | 1.83 | 1.72 |

| Substance | Substance Type[a] | PS/PHS Number[b] | Environmental quality standard[c] | Media - FW, MW, FW/MW or Biota[d] | Minimum Detection Limit[e] | Limit of Quantification[f] | Unit | Precision (RSD)% | Bias (%) |
|---|---|---|---|---|---|---|---|---|---|
| Diazinon | SP | | 0.01 | FW/MW | 0.0007 | 0.0021 | µg/l | 10.65 | 0.1 |
| Dimethoate | SP | | 0.48 | FW/MW | 0.0085 | 0.0255* | µg/l | 28.01 | -11.52 |
| Glyphosate[g] | SP | | 196 | FW/MW | | | µg/l | | |
| Iron | SP | | 1000 | FW/MW | 0.01 | 0.03* | mg/l | 3.09 | 0.01 |
| Linuron | SP | | 0.5 | FW/MW | 0.0096 | 0.15 | µg/l | 11.96 | 1.41 |
| Manganese | SP | | 123 | FW | 0.002 | 36.9* | µg/l | 3.03 | 0.05 |
| Mecoprop | SP | | 18 | FW/MW | 0.004 | 0.012 | µg/l | 9.5 | 2.25 |
| Methiocarb | SP | | 0.01 | FW | 0.0029 | 0.0081 | µg/l | 17.61 | 15.02 |
| Pendimethalin | SP | | 0.1 | FW | 0.0035 | 0.0105 | µg/l | 17.08 | 23.4 |
| Permethrin | SP | | 0.001 | FW | | | µg/l | | |
| cis-permethrin | | | | FW | 0.0005 | 0.0015* | µg/l | 14.04 | 11.87 |
| trans-permethrin | | | | FW | 0.0005 | 0.0015* | µg/l | 12.74 | 9.8 |
| Permethrin | SP | | 0.0002 | MW | | | µg/l | | |
| cis-permethrin | | | | MW | 0.0005 | 0.0015* | µg/l | 14.04 | 11.87 |
| trans-permethrin | | | | MW | 0.0005 | 0.0015* | µg/l | 12.74 | 9.8 |
| Phenol | SP | | 7.7 | FW | 6 | 30* | µg/l | 2.6 | 3 |
| Tetrachloroethane[g] | SP | | 140 | FW | | | µg/l | | |
| Toluene | SP | | 74 | FW/MW | 0.09 | 0.27 | µg/l | 5.36 | 4.13 |
| Triclosan[g] | SP | | 0.1 | FW/MW | | | µg/l | | |
| Zinc | SP | | 10.9 | FW | 1.87 | 0.87 | µg/l | 2.83 | 0.04 |
| Zinc | SP | | 7.9 | MW | 1.87 | 0.87 | µg/l | 2.83 | 0.04 |
| Phosphorus | other | | 12.7 | FW | 1.092 | 6* | µg/l | 1.6 | 0.07 |
| Phosphorus | other | | 5 | FW-Loch | 1.092 | 6* | µg/l | 1.6 | 0.07 |
| cobalt | other | | n/a | FW | 0.11 | 0.33 | µg/l | 2.87 | -0.003 |
| vanadium | other | | n/a | FW | 0.1 | 0.3 | µg/l | 3.38 | 0.02 |
| Alkalinity | other | | n/a | FW | 0.47 | 1.5* | mg/l as CaCO3 | 0.13 | -0.05 |
| Alkalinity | other | | n/a | FW | 1.75 | 9* | mg/l as CaCO3 | 2.2 | -0.56 |

| Substance | Substance Type[a] | PS/PHS Number[b] | Environmental quality standard[c] | Media - FW, MW, FW/MW or Biota[d] | Minimum Detection Limit[e] | Limit of Quantification[f] | Unit | Precision (RSD)% | Bias (%) |
|---|---|---|---|---|---|---|---|---|---|
| Calcium | other | | n/a | FW | 0.005 | 0.015* | mg/l | 3.23 | 0.03 |
| Dissolved organic carbon | other | | n/a | FW | 0.286 | 2* | mg/l | 4.5 | 4.4 |
| Magnesium | other | | n/a | FW | 0.005 | 0.015* | mg/l | 3.09 | 0.05 |

**Note to table A2.28**

Performance results cited in this table refer to results of validation exercises based on current best available techniques. Capabilities will change over time as available techniques / instrumentation improve.

[a] Substance types: 'PS' means priority substance; 'PHS' means priority hazardous substance; 'OP' means other pollutants, as listed in Annex I of 2008/105/EC as amended by 2013/39/EU; and 'SP' means specific pollutant.

[b] Number allocated to PS and PHS in Annex I of 2008/105/EC as amended by 2013/39/EU.

[c] For substances with no annual average water performance against the water column maximum allowable concentration (MAC) is included.

[d] Media to which the environmental standard applies: freshwater (FW), estuary and coastal water (MW), both (FW/MW) or biota. Separate entries are included for cases where analytical performance differs between media.

[e] 'Minimum detection limit' refers to the whole analytical process, and encompasses instrumentation limits of detection.

[f] Method development is in process for limits of quantification highlighted with an asterix. For cases where the limit is >1/3 of the environmental standard, further method development is under consideration within the constraints of best available techniques not entailing excessive costs.

g Method to be developed.

[h] Dissolved chromium data are used for classifying against Cr(III) and Cr(VI).

# Appendix 3: Heavily modified and artificial water bodies

## What are heavily modified and artificial water bodies

The physical characteristics of some of the district's surface waters have been substantially modified for purposes such as flood protection, land drainage, navigation and water storage for public supply or hydroelectricity generation.

Where restoring the water bodies to good ecological status would significantly compromise the benefits Scotland obtains from their modifications, we have designated them as heavily modified water bodies. Instead of good ecological status, our goal for these water bodies is to achieve good ecological potential. Good ecological potential is the ecological quality that can be achieved without a significant adverse impact on the benefits served by the modifications, including benefits to environmental interests, such as wildlife conservation.

## What we have done for this plan

We have designated 422 (15%) of the district's bodies of surface water as heavily modified water bodies and another 40 (1%) as artificial water bodies.

The designations were based on a review of:

i. the characterisation of surface water body types that we undertook for the first river basin management plan in 2009;
ii. the reasons for designation of those water bodies designated as heavily modified or artificial in that first plan.

The review considered:

(a) our latest data on pressures and impacts on bodies of surface water;
(b) changes in the uses of water bodies, including as a result of new developments that have been permitted since the first plan was published;
(c) whether any other means have become available that could provide equivalent benefits to those served by the modifications to the water bodies.

On the basis of the review, we have de-designated 41 of the heavily modified water bodies that we had designated in 2009 and designated an additional 89 heavily modified water bodies.

In the main summary of the plan for the district, we have not distinguished between non-heavily modified, heavily modified and artificial water bodies: When we have referred to a 'good condition' we mean good ecological status and good ecological potential. Details about heavily modified and artificial water bodies are available separately via the **Water environment hub.**

This appendix explains why we have designated water bodies as heavily modified or artificial and how we have assessed their condition – or ecological potential.

## Reasons why we designated water bodies as heavily modified and artificial

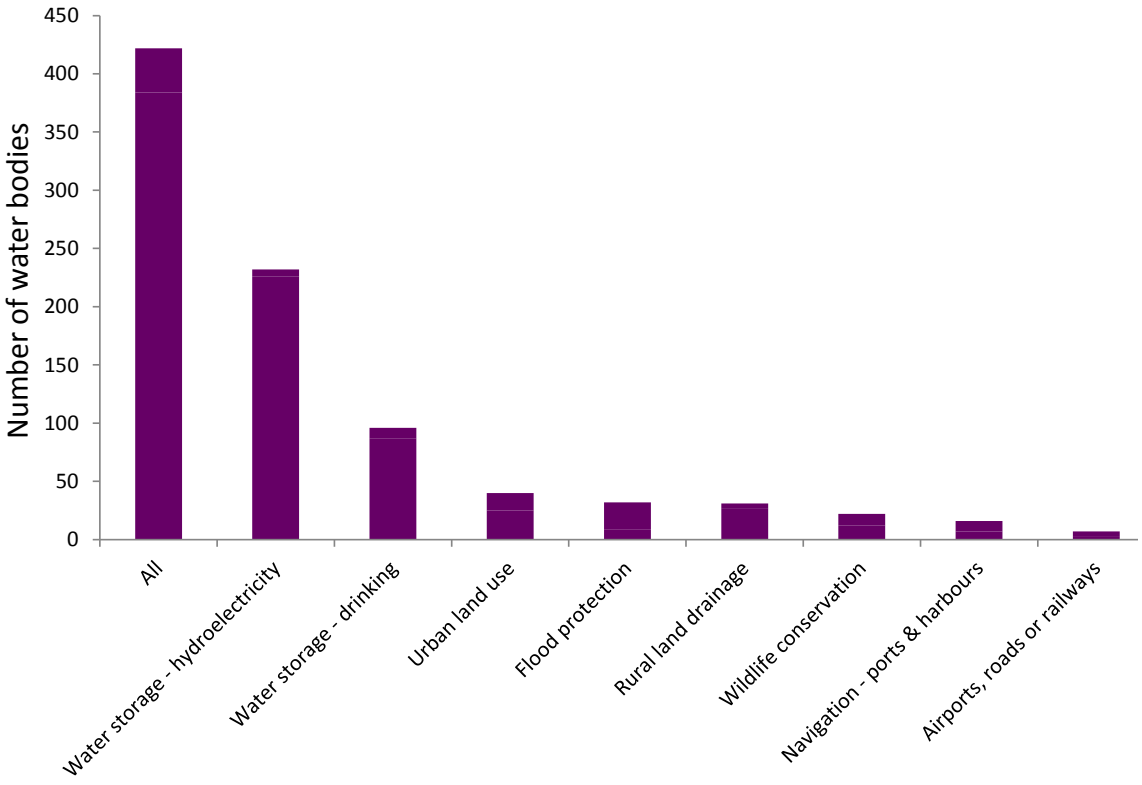
### Heavily modified water bodies

We designated the bodies of surface water as heavily modified where each of the following four criteria applied:

| **1. Modifications to the water body** | |
|---|---|
| **Criteria for designation as heavily modified** | **How this was determined** |
| • the water body's beds, banks or shores are not in the condition needed to achieve good ecological status; or<br>• the water body's water flows or levels are not in the condition needed for good ecological status because of storage of water in, abstraction from, or transfer to, a reservoir. | Assessment of whether or not the standards set out in the Scotland River Basin District (Standards) Directions 2014 for good status physical condition and good status flows and levels are met. |

| **2. Benefits served by the modifications** | |
|---|---|
| **Criteria for designation as heavily modified** | **How this was determined** |
| The modifications responsible for the impacts on the water body are necessary for:<br>• beneficial activities, such as the provision of drinking water, flood protection, enabling and protecting urban land uses, drainage of agricultural land, hydroelectricity generation or navigation; or<br>• wider environmental interests, such as wildlife conservation, or the protection of our built heritage. | Identification of the purposes served by the modifications (Figure A3.1). |

**Figure A3.1: Beneficial purposes served by the water bodies we have designated as heavily modified**




**Note to Figure A3.1:**
Thirty six heavily modified water bodies (9%) have modifications serving more than one beneficial purpose. The water bodies concerned feature in more than one of the bars in the figure.

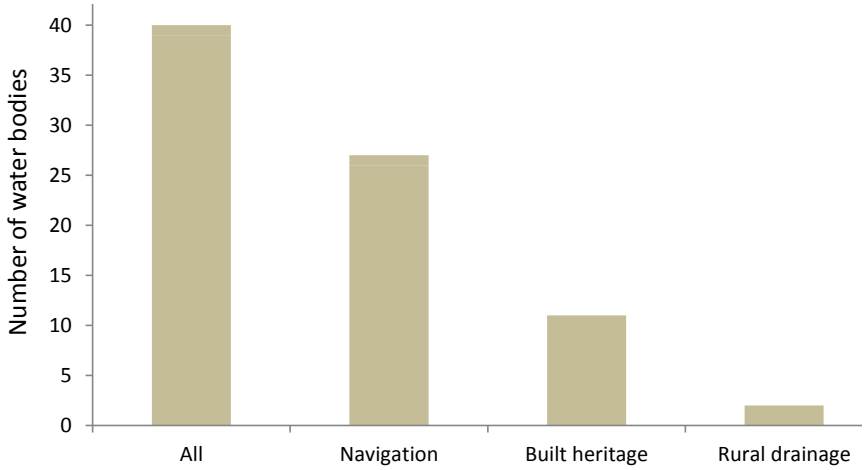
| 3. Impact of restoring a good condition on the benefits served by the modifications | |
|---|---|
| **Criteria for designation as heavily modified** | **How this was determined** |
| Restoring the conditions needed to achieve good ecological status would have a significant adverse effect on the benefits served by the modifications. | **For:**<br>• **Water storage for hydroelectricity or drinking water supply**<br>• **Urban land uses**<br>• **Flood protection**<br>• **Navigation – ports and harbours**<br>• **Wildlife conservation** |
| | • identification of the improvements required to achieve the standards set out in the Scotland River Basin District (Standards) Directions 2014 for good status physical condition and good status flows and levels;<br><br>• application of the criteria set out in national guidance to identify whether achievement of these standards would have a significant adverse effect on the benefits served by the modifications. |
| | **For:**<br>• **Rural land drainage** |
| | • identification of the improvements required to achieve the standards set out in the Scotland River Basin District (Standards) Directions 2014 for good status physical conditions;<br><br>• application of the following criteria to identify whether achievement of these standards would have a significant adverse effect on the benefits served by the modifications:<br>(i) the majority of the agricultural land benefiting from the modifications to the river (normally a combination of straightening and deepening) is prime agricultural land;<br>(ii) the improvements to the water body that could be made without affecting prime agricultural land are very limited and would not be sufficient to achieve the conditions needed for good status.<br><br>Prime agricultural land is land capable of producing high yields from at least a moderate range of crops according to our land capability for agriculture classification scheme. |
| | **For:**<br>• **Other sustainable development – airports, roads or railways** |
| | • identification of the improvements required to achieve the standards set out in the Scotland River Basin District (Standards) Directions 2014 for good status physical conditions;<br><br>• application of the following criteria to identify whether achievement of these standards would have a significant adverse effect on the benefits served by the modifications:<br><br>(i) the improvements required to achieve good ecological status would compromise the operation of a major airport or prevent the continued use of a major road or rail route. |

<table>
<tr><th colspan="2">4. Alternative means of securing the benefits of the modifications</th></tr>
<tr><th>Criteria for designation as heavily modified</th><th>How this was determined</th></tr>
<tr><td rowspan="6">The benefits served by the modified characteristics cannot, for reasons of technical feasibility or disproportionate costs, be achieved by other means which are a significantly better option.</td><td>For:<br>• Water storage for hydroelectricity or drinking water supply<br>• Urban land uses<br>• Flood protection<br>• Navigation - ports and harbours<br>• Wildlife conservation</td></tr>
<tr><td>Assessment of other means of providing equivalent benefits as set out in national guidance. The other means considered included, where relevant, providing the benefits by means of modifications to other water bodies or by using means not involving modifications to water bodies.</td></tr>
<tr><td>For:<br>• Rural land drainage</td></tr>
<tr><td>Assessment of whether the following conditions applied:<br><br>• the agricultural production affected could not be substituted by the use of prime agricultural land elsewhere in Scotland as such land is already in production;<br><br>• the land concerned could not be drained by other means that would allow restoration of the river without an equivalent adverse effect on agricultural production.</td></tr>
<tr><td>Or:<br>• Other sustainable development – airports, roads or railways</td></tr>
<tr><td>Assessment of whether the following condition applied:<br><br>• restoration of the water body to good status would require the relocation, of at least a significant part of an airport, major road or railway.</td></tr>
</table>

### Artificial water bodies

We designated bodies of surface water as artificial if they were created by people where no natural water body previously existed. The majority of the artificial water bodies are canals (Figure A3.2).

**Figure A3.2: Beneficial purposes served by the water bodies we have designated as artificial**



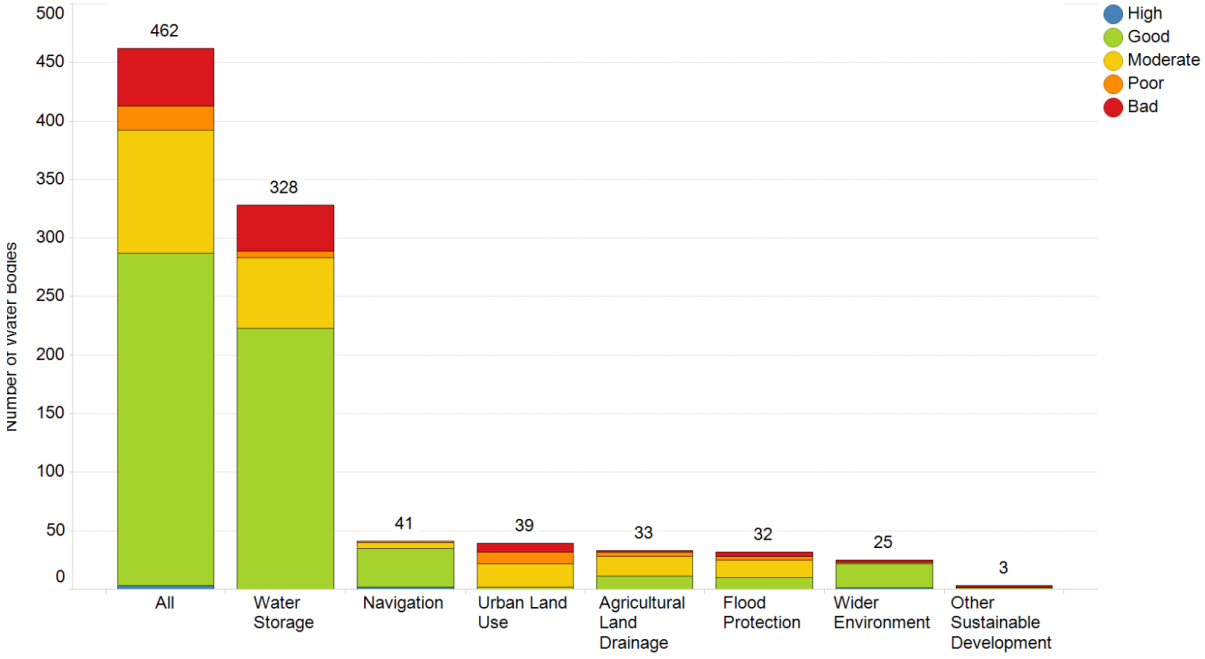

**Note to Figure A3.2:**
Only one artificial water body serves more than one beneficial purpose.

## How we assessed the condition of heavily modified and artificial water bodies

| Approach | Further details |
|---|---|
| We established and applied a framework of criteria and procedures to assess and classify the ecological potential of heavily modified and artificial water bodies. | The Scotland River Basin District (Status) Directions 2014 |
| We also established a set of environmental standards and associated assessment methods for application within the classification framework. | **Environmental standards**<br>Scotland River Basin District (Standards) Directions 2014 |
| | **Assessment methods**<br>Biological assessment methods;<br>Chemical assessment methods |
| Together with experts from across the UK, we developed a national library of mitigation measures and associated guidance to be taken into account in applying the classification framework. | **National library of mitigation measures:**<br>The classification of ecological potential for heavily modified and artificial water bodies<br><br>River flow for good ecological potential |
| To ensure our goals for the water environment do not significantly impact on the benefits provided by hydroelectricity generation, we set a limit on the associated reduction in hydroelectricity production between 2009 and 2027 of 100 gigawatt hours per year (around 2% of the hydroelectricity generated in Scotland in 2010). | **Ensuring the cumulative impacts of mitigation on hydroelectricity generation are not significant:**<br>Implementing the Water Environment and Water Services (Scotland) Act 2003: Assessing Scotland's water environment – use of environmental standards, condition limits and classification schemes |

In 2014, our data show that the modified characteristics of 62% of heavily modified and artificial water bodies (Figure A3.3) were in the condition necessary to enable the achievement of good ecological potential, subject to other pressures on the water bodies being addressed (e.g. pressures on water quality).

**Figure A3.3: Condition of heavily modified and artificial water bodies in 2014**




**Note to Figure A3.3**
Water bodies with modifications serving more than one beneficial purpose feature in more than one of the bars in the figure**.**

# Appendix 4: Protected areas

Parts of the water environment in the Scotland river basin district have been identified as requiring special protection because of their particular economic, social or environmental importance or their sensitivity to pollution.

This appendix provides information about protected areas in the plan and where you can find it.

**Table A4.1: Identification and mapping of protected areas**

| Reason for protection | Protected area name used in this plan | Establishment | Mapping | Number of areas |
|---|---|---|---|---|
| Abstraction of water intended for human consumption | Drinking Water Protected Area | The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013 | **Water environment hub** Maps published by Scottish Ministers | 858 |
| Economically significant shellfish | Shellfish Water Protected Area | Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013 | **Water environment hub** Maps published by Scottish Ministers | 84 |
| Bathing | Bathing Water Protected Area | Bathing Waters (Scotland) Regulations 2008 | **Water environment hub** Maps published by Scottish Ministers | 77 |
| Conservation of habitats or species of conservation importance where the maintenance or improvement of the status of water is an important factor in their protection | Protected areas for wildlife conservation: [Special Area of Conservation and Special Protection Area] | Those sites identified under the Conservation (Natural Habitats, &c.) Regulations 1994 where Scottish Natural Heritage and SEPA have determined, in accordance with UK-wide guidance, that the conservation of the protected species or habitats is dependent on the status of water. | **Water environment hub** | 321 |

**Table A4.1: Identification and mapping of protected areas continued**

| Reason for protection | Protected area name used in this plan | Establishment | Mapping | Number of areas |
|---|---|---|---|---|
| Safeguard rich and diverse coastal habitats and maintain a healthy marine ecosystem | Protected areas for wildlife conservation [Inshore Marine Protected Areas] | Designation orders for each area made under the Marine (Scotland) Act 2010 | **Water environment hub** Maps published by Scottish Ministers | 17 |
| Sensitivity to nutrient pollution | Nitrate Vulnerable Zone (NVZ) | The Designation of Nitrate Vulnerable Zones (Scotland) Regulations 2014 | **Water environment hub** Maps published by Scottish Ministers: Lothian and Borders NVZ; Strathmore and Fife NVZ; Moray, Aberdeenshire / Banff and Buchan NVZ | 3 |
| | Urban Waste Water Sensitive Area | Urban Waste Water Treatment (Scotland) Regulations 1994 | **Water environment hub** | 172 |

**Table A4.2: Maintenance of a register of protected areas**

| | |
|---|---|
| Duty to establish and maintain a register | The Water Environment and Water Services (Scotland) Act 2003; The Water Environment (Register of Protected Areas) (Scotland) Regulations 2004 |
| Responsibility for maintaining the register | SEPA |
| Copy of the register | Published on SEPA's website |

**Table A4.3: Protected area assessment schemes, monitoring networks and results of monitoring programmes**

| Protected area | Assessment scheme | Responsibility for making assessments | Map of monitoring networks | Results of monitoring programmes |
|---|---|---|---|---|
| Drinking water protected areas | The Scotland River Basin District (Status) Directions 2014 | SEPA | **Water environment hub** | **Water environment hub** |
| Shellfish water protected areas | The Scotland River Basin District (Quality of Shellfish Water Protected Areas) (Scotland) Directions 2015 | SEPA | **Water environment hub** | **Water environment hub** |
| Bathing water protected areas | Bathing Waters (Scotland) Regulations 2008 | SEPA | **Water environment hub** | **Water environment hub** Detailed report on bathing water monitoring results |
| Protected areas for wildlife conservation | For sites not achieving their conservation objective (i.e. in an unfavourable condition)according to site condition monitoring results, application for the relevant standards for good set out in The Scotland River Basin District (Standards) Directions 2014 | Scottish Natural Heritage and SEPA | **Water environment hub** | **Water environment hub** |
| Nitrate Vulnerable Zones (NVZ) | The Protection of Water Against Agricultural Nitrate Pollution (Scotland) 1996 | SEPA | **Water environment hub** | **Water environment hub** |
| Urban waste water sensitive area | The Urban Waste water Treatment (Scotland) Regulations 1994 | SEPA | **Water environment hub** | **Water environment hub** |

**Table A4.4: Objectives for protected areas, including instances where extended deadlines or less stringent objectives have been set or deterioration has been permitted**

| Protected area | Establishment of objectives | Objectives |
|---|---|---|
| Drinking water protected area | The Water Environment (River Basin Planning: Further Provision) Scotland) Regulations 2013 | **Water environment hub** |
| Shellfish water protected area | The Water Environment (Shellfish Water Protected Areas: Environmental Objectives etc.) (Scotland) Regulations 2013. | **Water environment hub** |
| Bathing water protected area | The Bathing Waters (Scotland) Regulations 2008 | **Water environment hub** |
| Protected area for wildlife conservation | The Conservation (Natural Habitats, &c.) Regulations 1994; The Marine (Scotland) Act 2010 | **Water environment hub** |
| Nitrate vulnerable zone | The Protection of Water Against Agricultural Nitrate Pollution (Scotland) 1996 | Reduce pollution by putting in place the measures specified in the Action Programme for Nitrate Vulnerable Zones (Scotland) Regulations 2008 |
| Urban waste water sensitive area | The Urban Waste water Treatment (Scotland) Regulations 1994 | Reduce pollution by putting in place the measures specified in the 1994 Regulations. |

# Appendix 5: Further work to improve our understanding of pressures on the water environment

Our understanding of the pressures on the district's 3,169 water bodies significantly increased over the period 2009 to 2015 but still needs improving. We will continue to expand our knowledge over the period 2015 to 2027. A better understanding is important to ensure our efforts to protect and improve the water environment are always targeted to best effect.

**Table A5.1: Impacts for which we need to identify the pressures responsible**

| **Impacts on plant and animal communities and on water quality** | | |
|---|---|---|
| **Key gaps in understanding** | • Pressures responsible where data show evidence of impact on the condition of aquatic plant or animal populations but we are uncertain why;<br>• Pressures responsible where data show evidence of pollution but we are uncertain of the sources. | |
| **Why filling them is important** | We cannot take the appropriate measures until we have identified the pressures responsible. | |
| **How big they are** | Number of protected areas for the conservation of freshwater pearl mussels with such impacts. | 15 |
| | Number of protected areas for shellfish with such impacts. | 50 |
| | Number of water bodies with such impacts. | 190 |
| **Actions to fill them** | During the period 2015 to 2021, we will carry out the investigations and research necessary to identify the pressures responsible. | |

**Table A5.2: Pressures for which we need to improve our understanding of the extent of their impacts**

| **Pressures on water quality** | |
|---|---|
| **Key gaps in understanding** | • Extent of pollution by hazardous substances from diffuse urban sources;<br>• Extent of pollution from legacy sources of pollutants in contaminated ground. |
| **Why filling them is important** | We may need to take additional action to achieve our objectives for some water bodies. |
| **How big they are** | There is evidence that a greater number of water bodies are likely to be adversely affected than our assessments in 2014 indicate. |
| **Actions to be taken** | During the period 2015 to 2021, we will carry out the monitoring and assessment work necessary to understand the extent of impacts and identify measures to address them. |

**Table A5.2: Pressures for which we need to improve our understanding of the extent of their impacts continued**

| **Pressures on physical condition** | |
|---|---|
| **Key gaps in understanding** | • Extent of pressures on the physical modifications of some rivers;<br>• Extent of pressures on the physical condition of the sea bed from the use of bottom trawling gears. |
| **What they mean** | We may need to adjust where we take action in the period 2021 to 2027. |
| **How big they are** | We have collected considerable information about physical modifications of all river water bodies. We have an ongoing programme of field survey work that has already corrected and validated information for a large number of water bodies. That programme has identified that the impact of some pressure can be overestimated and the impact of others underestimated in some water bodies. |
| **Actions to fill them** | During the period 2015 to 2021, we will carry out the monitoring and assessment work necessary to improve our understanding of the extent of impacts. |
| **Pressures on flows and levels** | |
| **Key gaps in understanding** | Extent of impacts from water flow or level changes where flows or levels are only slightly worse than the standard expected for good. |
| **Why filling them is important** | It will help us confirm where action to improve flows and levels is required in the period 2021 to 2027. |
| **How big they are** | There are currently 220 river water bodies where water flows or levels are close to the boundary between good and moderate conditions. |
| **Actions to fill them** | During the period 2015 to 2021, we will develop and apply new and improved assessment methods to increase our understanding of the impact of pressures on flows and levels. |

**Table A5.3: Pressures likely to increase over the period 2015 to 2027**

| | |
|---|---|
| **Changes in pressures resulting from climate change** | |
| **Key gaps** | Early warning on where and when increases in pressures or their impacts as a result of climate change will be most significant. |
| **Why filling them is important** | Over the period 2015 to 2027, a key task of river basin management is to make sure we plan how to cope with effects of climate change on flows and levels, water quality and the spread of non-native invasive species. |
| **How big they are** | We know that there will be effects on the water environment from climate change. We are not certain about their scale and when and where they will be most severe. |
| **Actions to fill them** | During the period 2015 to 2027, we will continue to improve our understanding of the impact of climate change on the water environment. |
| **Changes in pressures resulting from the expansion of aquaculture** | |
| **Key gaps** | Understanding of the likely risks posed by expansion of marine fish farming and how to manage them. This includes understanding of the risk of infection with sea lice of wild fish populations and the consequent risk to populations of freshwater pearl mussels that depend on those fish. |
| **Why filling them is important** | One of our key purposes for river basin management is to support and guide sustainable development. This requires information on risks to the water environment. |
| **How big they are** | Expansion of the aquaculture industry is likely and will provide important social and economic benefits. However, there are indications that in some locations fish farming can have adverse impacts on the water environment. |
| **Actions to fill them** | During the period 2015 to 2021, we will increase our understanding of the risks to the water environment that could result from a growing aquaculture sector and identify how those risks can be managed. |

# Appendix 6: Progress towards achieving objectives for 2015 and summary of the changes made by this plan

This appendix provides our assessment of the progress that we made during the period 2009 to 2015 towards the achievement of the environmental objectives we established in the first river basin management plan in 2009.

To identify the progress made, we undertook a detailed analysis of our information about each water body, including the results of monitoring programmes. We needed to make the assessment on the basis of such an analysis because we could not rely on simply comparing the assessment of the condition of the water environment published in the first plan in 2009 with that undertaken for this plan. Over the intervening period we have:

- collected much more information about the water bodies in the district;
- developed and refined the methods and environmental standards we use to interpret data and make our assessments;
- refined the boundaries of bodies of groundwater and surface water - including splitting some into more than one body - to reflect our improving understanding of how the condition of the water environment varies from place to place.

The resulting improvements in our understanding account for a significant proportion of the difference between our 2009 and 2014 assessments.

## Progress in improving the condition of water bodies

In that first plan, we set out to improve the condition of 256 bodies of surface water and 42 bodies of groundwater by 2015.

### Progress in improving the condition of bodies of surface water

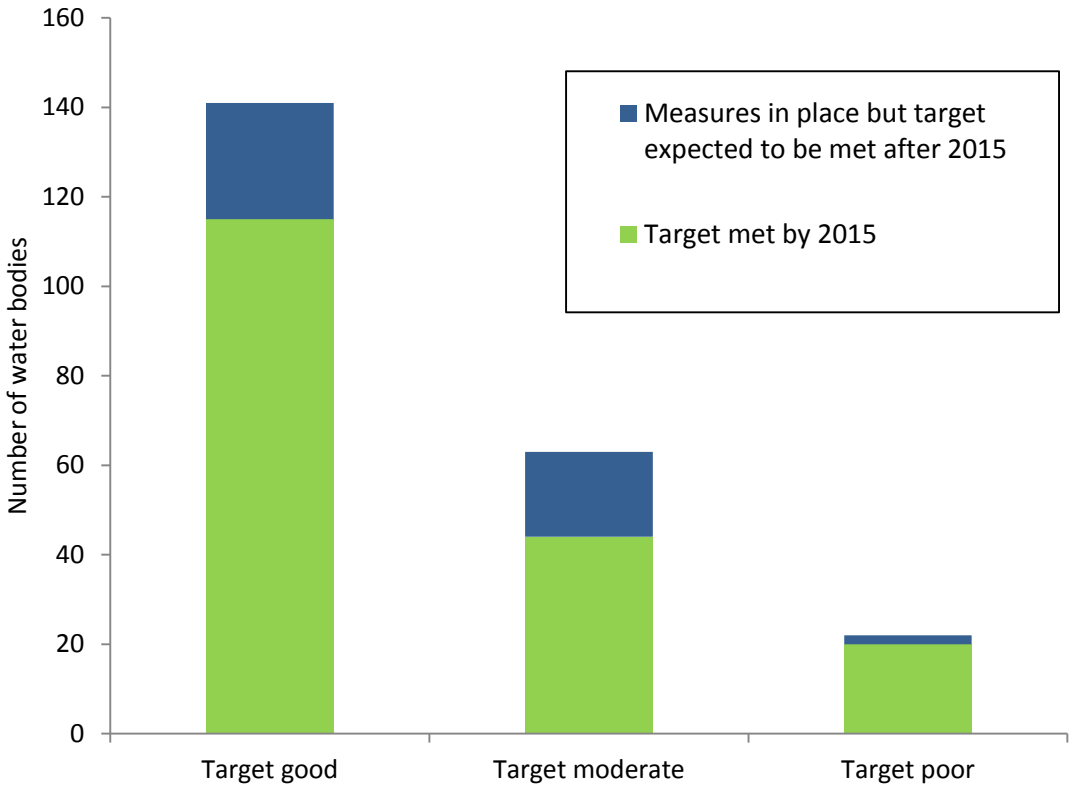
The progress we made in improving bodies of surface water is summarised in Table A6.1 and Figure A6.1.

**Table A6.1: Progress in improving the condition of bodies of surface water during the period 2009 to 2015**

| Progress by 2015 | Number of water bodies |
|---|---|
| Improvement target reached. | 179 |
| Measures completed but natural recovery processes mean that the objective will be achieved after 2015. | 47 |

**Note to table A6.1:**
Improvements planned for 63 bodies of surface water were substituted by improvements to an equivalent number of other water bodies to reflect our changing understanding of priorities. Improvements to the former have been re-prioritised for action in the period 2015 to 2027.

**Figure A6.1: Progress in improving the condition of rivers, lochs, estuaries and coastal waters during the period 2009 to 2015**




Over the period 2009 to 2015, our targets have been met in, or the actions necessary to meet them completed for, 226 water bodies, 30 fewer bodies of surface water than originally planned. For four of these, the necessary actions were only slightly delayed and we expect them to be completed early in the period 2015 to 2021. Table A6.2 outlines the reasons we did not achieve our targets in the remaining 26 water bodies.

**Table A6.2: Reasons why improvement targets for the condition of water bodies were not achieved**

| Reason improvement targets were not achieved | Overview | Interim action taken | Number of water bodies |
|---|---|---|---|
| It proved infeasible to complete the necessary actions and achieve the improvement target by 2015. Action to achieve the improvement target is included in the programme of measures established in the second plan. | We overestimated the scale of the programme of measures that we could feasibly complete by 2015 to improve the physical condition of water bodies. Consequently, we were unable to address the same number of water bodies as originally planned. | During the period 2009 to 2015:<br>• Scottish Ministers increased the level of funding available to support action;<br>• SEPA created a dedicated unit to promote and support action;<br>• where action was unavoidably delayed, possible effort was switched to other water bodies, to ensure as much progress as possible by 2015. | 22 |
| | We overestimated the scale of the programme of measures that we could feasibly complete by 2015 to remove barriers to fish migration. Consequently, we were unable to remove the planned number of barriers and hence improve the same number of water bodies as originally planned. | | 11 |
| | It proved infeasible to complete all the works planned to address the impacts of hydroelectricity generation. | Action on three water bodies was re-prioritised to allow efforts to be concentrated on the other affected water bodies. | 3 |
| | The scale of the programme of works required to address pollution impacts proved significantly greater than anticipated in the river basin plan. | We instigated strategic studies to identify suitable solutions integrated with wider objectives such as urban drainage improvements and flood risk management. | 3 |

**Table A6.2: Reasons why improvement targets for the condition of water bodies were not achieved continued**

| Reason improvement targets were not achieved | Overview | Interim action taken | Number of water bodies |
|---|---|---|---|
| Completing the required actions in the timescale would have been disproportionately expensive. | We did not have certainty that action would improve the condition of the water bodies concerned:<br>• we were not certain of the impact of pressures on water flows and levels in four of the water bodies;<br>• for one water body, we could not be certain that action aimed at improving fish passage would be beneficial until we know if other action downstream enables migratory fish to reach the water body concerned;<br>• for one water body affected by pollution, indications of an improving trend in water quality and uncertainty whether current water quality conditions are causing ecological impacts meant that we could not be certain that further action was needed. | Targeted investigations and monitoring was undertaken but could not resolve the uncertainties in the timescale. | 6 |

**Note to Table A6.2:**
For a number of water bodies, we did not achieve our target for 2015 for more than one reason. These water bodies are counted in more than one of the rows in the table.
Further explanation of the reasons is available in the information provided for each water body in the **Water environment hub.**

## Progress in improving the condition of bodies of groundwater

During the period 2009 to 2015, we revised the delineation of bodies of groundwater making direct assessments of progress impossible. However, the total area of groundwater across the district in a good condition increased by around 4,400 $km^2$, which is broadly in line with our improvement target.

## Progress in preventing deterioration in the condition of water bodies

One of the primary objectives of the programme of measures we established in the first river basin management plan in 2009 was to protect water bodies from deterioration.

To help inform and target action to achieve this objective, we used monitoring results to identify trends in the concentration of pollutants that could, if unchecked, lead to deterioration in the condition of water bodies[1]. We also identified water bodies at risk from the spread of invasive non-native species and those that had little capacity to accommodate any increase in pressure and were potentially at risk of deterioration.

All developments that would pose a risk to the water environment were made subject to a requirement for prior-authorisation before they could proceed. Where a development proposal would entail significant new modifications to, and resulting deterioration of, the water environment, authorisation was only granted where:

- the development's benefits to sustainable development, human health or the maintenance of human safety outweighed the benefits of preventing deterioration and achieving a good condition;
- for reasons of technical feasibility or disproportionate cost, the development's benefits could not be achieved by other means, which would represent a significantly better environmental option;
- all practicable steps would be taken to mitigate the adverse impact on the condition of the water bodies concerned.

**Table A6.3: Progress in preventing deterioration in the condition of water bodies**

| | **Number of water bodies where their condition was maintained** |
|---|---|
| Target set for the period 2009 to 2015 | 3,169 (100%) |
| Target achieved | 3,064 |

**Table A6.4: Reasons where deterioration occurred**

| **Reason target not achieved** | **Number of water bodies where deterioration in their condition was permitted during the period 2009 to 2015** |
|---|---|
| New modifications permitted to enable increased hydroelectricity generation | 97 |
| New modifications permitted to secure public drinking water supplies | 8 |

**Note to table A6.4:**
Further explanation of the reasons deterioration was permitted is available in the information provided for each water body in the **Water environment hub**.

[1]See http://www.sepa.org.uk/media/37219/current-condition_challenges-for-future_scotland-river-basin-district_public-consultation.pdf

## Progress in achieving our objectives for protected areas

In 2009, we set improvement objectives for the period 2009 to 2015 for a number of protected areas for shellfish, wildlife conservation and bathing. During the period, we:

- introduced new, stricter standards and more challenging targets for protected areas for bathing and shellfish;
- de-designated some areas and designated others for the first time. For example, eight shellfish waters that had improvement objectives for 2015 were de-designated on the basis that they were no longer in use for economically important shellfish production.

We also set the objective of preventing deterioration in the quality of drinking water protected areas over the period 2009 to 2015. Seven drinking water protected areas were identified as at particular risk and targeted action was taken to protect them, including action to address rural diffuse pollution.

**Table A6.5: Progress towards achieving our targets for protected areas**

| | No. of drinking water protected areas where water quality was safeguarded and maintained | No. of bathing waters in a sufficient, good or excellent condition | No. of shellfish waters in a good condition | No. of protected areas for wildlife where the water bodies on which the areas' objectives depend are in the required target condition[2] |
|---|---|---|---|---|
| Target set for 2015 | 858 (100%) | 77 (100%) | 45 | 11 |
| Target achieved | 858 | 64 | 28[1] | 4 |

**Note to table A6.5:**

1. Another six shellfish waters achieved the target for good that applied prior to the introduction of stricter standards.
2. For protected areas for wildlife, our target was to improve those characteristics of the water bodies on which the conservation of the protected wildlife depends to a good condition.

## Summary of changes since the publication of the first river basin management plan in 2009

The following section summarises how this plan changes the first plan we published in 2009. We have made the changes in response to:

- improvements in our understanding of pressures and impacts on the water environment and where action is needed and the scale of that action;
- the significant management challenges that we identified during the course of implementing the first plan between 2009 and 2015;
- improvements in our understanding of where we can prioritise action to deliver the greatest benefits.

Feedback and advice from businesses, voluntary organisations, scientists and the wider public has informed each of the above and our response to them.

The first plan included improvement targets for 2021 and 2027. It also identified a number of water bodies where the achievement of a good condition was not considered possible. In preparing this plan, we considered afresh each water body that was not in a good condition in 2015. Wherever feasible and proportionate, we have set an objective of achieving a good condition in these water bodies by 2021, natural rates of recovery permitting.

### Pressures on water quality – rural diffuse pollution

**Table A6.6: Summary of changes to measures**

| Revised and strengthened approach to tackling diffuse pollution:<br>• Step change in effort with action in all the remaining priority catchments starting in the period 2015 to 2021;<br>• Establishment of diffuse pollution focus areas with investigations and actions planned to commence in the period 2015 to 2021.<br><br>We have also used our latest understanding of the time likely to be needed to flush pollutants out of the system and for healthy water plants and animal communities to re-establish following the completion of measures. This has been factored into the dates we expect our objectives to be reached. | Plan | Number of water bodies | | | | |
|---|---|---|---|---|---|---|
| | | Action planned to commence in the period 2015 to 2021 | Good by 2021 | Action planned to commence in the period 2021 to 2027 | Good by 2027 | Good after 2027 |
| | 1st | 107 | 107 | 86 | 86 | - |
| | 2nd | 235 | 113 | - | 62 | 71 |

### Modifications to the physical condition of water bodies and barriers to fish migration

To maximise the benefits delivered by the programme of measures over the period 2015 to 2021, we have re-prioritised effort between action to improve physical condition and action to remove barriers to fish migration. This has involved:

- significantly increasing our targets for removing barriers to fish migration because of the potential to restore access for fish migration to a very large area of river habitat;
- focusing effort on fewer but more demanding improvements to the physical condition of water bodies (in terms of the complexity and costs of the works required) where we expect to deliver particularly significant social and economic benefits.

**Table A6.7: Summary of changes to measures and objectives for the physical condition of water bodies**

| | Plan | Number of water bodies | |
|---|---|---|---|
| | | Good by 2021 | Good by 2027 |
| • Step change in approach to securing action with a strengthened delivery framework and increased funding to support action;<br>• Studies to scope all improvements planned for the period 2021 to 2027 to be completed in the period 2015 to 2021 to help streamline action in the period 2021 to 2027;<br>• Water bodies re-prioritised for the period 2015 to 2021 where their improvement is expected to provide significant social and economic benefits. | 1st | 117 | 217 |
| | 2nd | 41 | 214 |

**Table A6.8: Summary of changes to measures and objectives in relation to barriers to fish migration**

| | Plan | Number of water bodies | |
|---|---|---|---|
| | | Good by 2021 | Good by 2027 |
| • Step change in approach with a strengthened delivery framework, increased funding to support action, and a substantially increased number of water bodies targeted for improvement by 2021;<br>• Studies to scope all improvements planned for the period 2021 to 2027 to be completed in the period 2015 to 2021 to help ensure action can be completed by 2027;<br>• Action prioritised for the period 2015 to 2021 based on a much improved understanding of the benefit to fish stocks as well as the number of barriers in the district. | 1st | 62 | 116 |
| | 2nd | 167 | 126 |

## Pressures on water flows and levels

**Table A6.9: Summary of changes to measures and objectives**

| | Plan | Number of water bodies | |
|---|---|---|---|
| | | Good by 2021 | Good by 2027 |
| • Re-phased objectives, setting a target of good by 2021 except where (a) we are not certain that pressures on flows and levels are resulting in impacts on water plants and animals; or (b) the scale of the programme of works required would be infeasible to complete by 2021;<br>• Action prioritised for the period 2015 to 2021 based on a much improved understanding of impacts of pressures on flows and levels. | 1st | 43 | 241 |
| | 2nd | 109 | 112 |

# Appendix 7: An inventory of emissions for priority substances for the Scotland river basin district

## Why we compiled the inventory

Under the Environmental Quality Standards (EQS) Directive[2], which supplements the Water Framework Directive (WFD), we are required to report an inventory of emissions, discharges and losses of all priority substances and pollutants for the Scotland river basin district. For this river basin planning cycle we are reporting a baseline inventory in accordance with this requirement. This baseline will be the subject of future updates as required under the EQS Directive and Article 5 of the WFD.

We will use the inventory to help identify the main sources of listed substances in the environment and to target and demonstrate the effectiveness of programmes of measures aimed at reducing or phasing out inputs of priority substances to surface waters. The inventory will also be used by the European Commission for compliance checking with the objectives of Article 4 of the WFD on the reduction of emissions, discharges and losses for priority substances and cessation or phasing out of discharges, losses and emissions for priority hazardous substances.

## How we compiled the inventory

Under the WFD Common Implementation Strategy (CIS), a guidance document[3] was developed for the preparation of the inventory. The guidance states that if a substance meets particular relevance criteria then an in-depth inventory of emissions, discharges and losses from point and diffuse sources, as well as loads transported in rivers, should be provided. By identifying relevant substances we can concentrate our efforts on those chemicals posing the greatest concern. We based our approach to compiling the inventory on this guidance, as explained below.

The EQS Directive states that the reference period for the inventory should be one year between 2008 and 2010, unless the substance is covered by Regulation 91/414/EEC (regarding plant protection products) where a three-year average can be used. Our inventory was compiled using 2009 – 2011 environmental monitoring data and 2010 point source effluent and Scottish Pollutant Release Inventory (SPRI) data.

Table A7.1 below, taken from the CIS guidance, provides a series of steps used to produce an inventory of emissions.

[2] Directive 2008/105/EC

[3] CIS for WFD. Draft technical guidance on the preparation of an inventory of emissions, discharges and losses of priority and priority hazardous substances.

### Table A7.1: Scheme of tiered approach for establishing an inventory

| Tier | Building Blocks | Expected Output | Results for the Inventory |
|---|---|---|---|
| **STEP 1: ASSESSMENT OF RELEVANCE** | | | |
| | Information sources identified in Art.5 of EQS directive, see section I.1 | Decision of relevance | List of relevant and less relevant substances |
| **STEP 2: APPROACHES FOR RELEVANT SUBSTANCES** | | | |
| 1. Point source information | • Data on point sources;<br>• Emissions factors. | • Availability of data;<br>• Quality of data;<br>• Identification of gaps. | • Point source emissions;<br>• Listing of identified data gaps. |
| 2. Riverine load approach | Add:<br>• River concentration;<br>• Data on discharge;<br>• In stream processes. | • Riverine load;<br>• Trend information;<br>• Proportion of diffuse and point sources;<br>• Identification of gaps. | • Rough estimation of total lumped diffuse emissions;<br>• Verification data for pathway and source orientated approaches;<br>• Listing of identified data gaps. |
| 3. Pathway oriented approach | Add:<br>• Land use data;<br>• Data on hydrology;<br>• Statistical data. | • Quantification and proportion of pathways;<br>• Identification of hotspots;<br>• Information on adequacy of POM. | • Pathway specific information;<br>• Additional spatial information on emissions. |
| 4. Source orientated approach | Add:<br>• Production and use data e.g. from REACH;<br>• SFA;<br>• Substance specific emissions factors. | • Quantification of primary sources;<br>• Complete overview of substance cycles;<br>• Information on adequacy of POM. | • Source specific emissions;<br>• Total emissions to environment and proportion to surface waters. |

## Selecting relevant chemicals for the inventory

### Step 1: Assessment of Relevance

We used five relevance criteria as detailed in the CIS guidance to select substances requiring in-depth emission estimation. The relevance criteria are based on compliance with environmental quality standards (EQS), levels of emissions, trends, and expert knowledge. These are as follows:

1. The substance causes a failure of good chemical status in at least one water body;
2. The concentration of the substance is above half of the EQS in more than one water body;
3. Monitoring shows an increasing trend in concentrations that may cause problems for future RBMP cycles;
4. Pollutant Release and Transfer Register (PRTR) data show releases that might lead to concentrations matching the above criteria;
5. Known sources and activities causing inputs in the river basin district exist that might lead to concentrations matching the above criteria.

In-depth emissions were estimated for substances meeting one or more of these criteria. For completeness we also calculated a basic estimate of emissions, losses and discharges for substances that did not meet any of these criteria.

## How we used measured and modelled data in the inventory

### Step 2: Approaches for relevant substances

The CIS guidance[2] states that point sources (tier 1) and an estimation of diffuse inputs (tier 2) should be provided as a minimum for substances identified as being relevant. The available data allowed us to meet this obligation as outlined below. The data/methodology were not available for the pathway (tier 3) and source-orientated (tier 4) approaches.

**Tier 1 - Point source information**
We estimated point sources to water by summing 2010 data returns from the Scottish Pollution Release Inventory (SPRI) discharge loads and other effluent discharge loads we monitored for national regulatory purposes for each relevant substance. As well as discharges to rivers, this included direct discharges to the marine environment.

**Tier 2 - Riverine load approach**
We used OSPAR principles, as indicated in the CIS guidance, and SPRI and other river discharge load data to calculate the diffuse riverine load of priority substances using the following formula:

Diffuse load = riverine load at mouth of river - Σ(SPRI and other river loads to the catchment)

The OSPAR load calculation methodology was expanded to include all priority substances (when monitoring data were available) to provide the riverine load. SPRI and other monitored discharges to a catchment were summed to provide an estimate of the point source load to the catchment. Subtracting this from the riverine load as described above provided an estimate of the diffuse load. There are some shortcomings with this approach: we have limited riverine monitoring data for some priority substances, and many relevant substances are lipophilic in nature (i.e. they partition out of the water column into other media e.g. biota or sediment, such that measured water column concentrations will be reduced).

## Results, conclusions and future updates

Table A7.2 below shows the inventory of emissions for the Scotland river basin district. For clarity and completeness we decided to include all priority substances under the EQS Directive where the data indicated there were emissions, whether relevance criteria had been met or not.

The following points should be noted:

- Though this inventory provides a baseline, as we collect more data the baseline is likely to change (the CIS guidance includes the provision to update the baseline).
- In some cases environmental monitoring data were limited so we were unable to estimate diffuse loads.
- River flow data used to calculate diffuse riverine loadings introduce a major source of variation with potential wide ranging differences in flow depending on the data source.

- Many substances have a tendency to partition into sediment and biota, reducing concentrations measured in the water column. We have not taken this into account in our diffuse load estimates.
- Comparison with other river basin districts within the UK and Member States may be difficult due to differences in the methodology used to develop inventories.

Overall, there is significant uncertainty associated with many of the estimates. This is recognised in the CIS guidance as a consequence of methodological constraints for what are very complex real world scenarios. Preparation of the updated inventory is scheduled for 22 December 2019. We will undertake further work, where possible collaboratively with other UK devolved administrations, to refine and improve our estimation methods for all chemicals, with the aim of revisiting and refining these baseline year estimates prior to the next RBMP cycle.

**Table A7.2: Inventory of emissions to Scotland river basin district 2010 (Kg/year)***

| Substance | Riverine point source load | Riverine diffuse source load | Marine direct discharge load | Total point source load | Total load | Relevance criteria met |
|---|---|---|---|---|---|---|
| 1,2 Dichloroethane | 0.0 | 164.5 | 0.0 | 0.0 | 164.5 | n/a |
| 4-Nonyl-Phenol | 44.9 | 1001.2 | 105.2 | 150.0 | 1151.2 | 1,2,5 |
| Nonylphenol ethoxylates | 1140.1 | 0.0 | 2074.8 | 3214.9 | 3214.9 | 5 |
| Anthracene | 4.0 | 37.7 | 31.6 | 35.6 | 73.4 | 5 |
| Atrazine | 0.0 | 35.7 | 0.0 | 0.0 | 35.7 | n/a |
| Benzene | 0.0 | 0.0 | 12412.0 | 12412.0 | 12412.0 | n/a |
| Benzo(a)pyrene | 0.0 | 40.1 | 5.1 | 5.1 | 45.2 | 5 |
| Benzo(b)fluoranthene | 0.0 | 4.5 | 3.9 | 3.9 | 8.4 | 5 |
| Benzo(ghi)perylene | 0.2 | 2.5 | 5.5 | 5.8 | 8.2 | 1,2,5 |
| Benzo(k)fluoranthene | 0.0 | 6.2 | 1.7 | 1.7 | 7.9 | 5 |
| Brominated diphenylethers | 2.4 | 0.0 | 6.0 | 8.4 | 8.4 | 5 |
| Cadmium | 35.4 | 572.5 | 155.5 | 190.8 | 763.3 | 1,2,3,4 |
| Chloroform | 195.4 | 324.9 | 5427.6 | 5622.9 | 5947.8 | n/a |
| Diethyl Hexyl Phthalate | 666.3 | 5946.5 | 1924.1 | 2590.4 | 8536.9 | 2,4 |
| Dichloromethane | 0.0 | 4422.5 | 0.0 | 0.0 | 4422.5 | n/a |
| Fluoranthene | 3.1 | 43.1 | 84.4 | 87.4 | 130.5 | 5 |
| Hexachlorobenzene | 0.0 | 11.4 | 0.1 | 0.1 | 11.5 | n/a |
| Hexachlorocyclohexane | 0.3 | 0.0 | 5.1 | 5.4 | 5.4 | n/a |
| Indeno(123cd)pyrene | 0.0 | 1.4 | 1.9 | 1.9 | 3.2 | 5 |
| Lead | 478.5 | 24091.2 | 3517.1 | 3995.6 | 28086.9 | 1 |
| Mercury | 23.9 | 83.1 | 69.2 | 93.1 | 176.1 | 1,5 |
| Naphthalene | 3.0 | 250.5 | 532.6 | 535.6 | 786.1 | 5 |
| Nickel | 1861.5 | 45639.9 | 9564.1 | 11425.7 | 57065.6 | 4 |
| Octylphenol | 113.6 | 58.4 | 469.5 | 583.0 | 641.5 | 4 |
| Pentachlorobenzene | 0.0 | 2.3 | 0.0 | 0.0 | 2.3 | 1 |
| Pentachlorophenol | 0.8 | 3.6 | 8.9 | 9.7 | 13.2 | 1,5 |
| Simazine | 0.0 | 3.5 | 0.0 | 0.0 | 3.5 | 5 |
| Tributyltin compounds | 0.7 | 0.0 | 1.4 | 2.1 | 2.1 | 4 |
| Trichlorobenzene | 0.1 | 2.2 | 12.4 | 12.5 | 14.7 | 5 |
| Trifluralin | 0.0 | 5.1 | 0.0 | 0.0 | 5.1 | 4 |

**Relevance criteria:**

1. It causes a failure of good chemical status in at least one water body;
2. The concentration of the substance is above half of the EQS in more than one water body;
3. Monitoring shows an increasing trend in concentrations which may cause problems for future river basin management planning cycles;
4. SPRI data show releases which might lead to concentrations matching the above criteria (carried out for rivers only);
5. Known sources and activities causing inputs in the river basin district exist which might lead to concentrations matching the above criteria.

n/a results for priority substances with emissions, but that did not meet any relevance criteria.

* For priority substances not listed, the data assessed showed no evidence of emission.

# Appendix 8: Summary of the programme of measures

This appendix summarises the programme of measures that will be used to achieve our goals for the protection and improvement of the district's water environment. It includes information about roles and responsibilities with respect to the programme, coordination arrangements for different parts of the programme and examples of the wide range of different measures in the programme.

The contact point for details on the basic control measures listed in this Appendix is Scottish Ministers. Contact details are provided in Appendix 1.

**Table A8.1: Competent authorities – general role with respect to measures**

| **Authority** | **Relevant functions** *[The Water Environment (Relevant Enactments and Designation of Responsible Authorities and Functions) (Scotland) Order 2011]* | **Duties** *[under Water Environment and Water Services (Scotland) Act 2003]* |
|---|---|---|
| Scottish Ministers | Coast Protection Act 1949;<br>Roads (Scotland) Act 1984;<br>Natural Heritage (Scotland) Act 1991;<br>The Protection of Water Against Agricultural Nitrate Pollution (Scotland) Regulations 1996;<br>Town and Country Planning (Scotland) Act 1997;<br>Water Industry (Scotland) Act 2002;<br>The Environmental Impact Assessment (Agriculture) (Scotland) Regulations 2006;<br>Transport and Works (Scotland) Act 2007;<br>Aquaculture and Fisheries (Scotland) Act 2007;<br>The Bathing Waters (Scotland) Regulations 2008;<br>The Aquatic Animal Health (Scotland) Regulations 2009;<br>The Flood Risk Management (Scotland) Act 2009;<br>The Marine (Scotland) Act 2010;<br>The Water Environment (Controlled Activities) (Scotland) Regulations 2011. | • secure compliance with the requirements of the Water Framework Directive when exercising relevant functions;<br>• so far as practicable, adopt an integrated approach by cooperating with each other and responsible authorities with a view to coordinating the exercise of their respective functions. |
| Scottish Environment Protection Agency (SEPA) | The Water Environment (Controlled Activities) (Scotland) Regulations 2011;<br>The Bathing Waters (Scotland) Regulations 2008;<br>The Flood Risk Management (Scotland) Act 2009. | |

**Table A8.2: Co-ordinated approach - responsible authorities**

| **Authority** | **Relevant functions** *[The Water Environment (Relevant Enactments and Designation of Responsible Authorities and Functions) (Scotland) Order 2011]* | **Duties** *[under Water Environment and Water Services (Scotland) Act 2003]* |
|---|---|---|
| Local authorities | The Coast Protection Act 1949 | • secure compliance with the requirements of the Water Framework Directive when exercising relevant functions;<br>• so far as practicable, adopt an integrated approach by cooperating with each other, the SEPA and Scottish Ministers with a view to coordinating the exercise of their respective functions;<br>• have regard to the river basin management plan. |
| | The Civic Government (Scotland) Act 1982 | |
| | The Roads (Scotland) Act 1984 | |
| | The Environmental Protection Act 1990 | |
| | The Town and Country Planning (Scotland) Act 1997 | |
| | The Flood Risk Management (Scotland) Act 2009 | |
| | The Bathing Waters (Scotland) Regulations 2008 | |
| Scottish Water | The Sewerage (Scotland) Act 1968 | |
| | The Water (Scotland) Act 1980 | |
| | The Water Industry (Scotland) Act 2002 | |
| | The Urban Waste Water Treatment (Scotland) Regulations 1994 | |
| Scottish Natural Heritage | The Natural Heritage (Scotland) Act 1991 | |
| | The Nature Conservation (Scotland) Act 2004 | |
| | The Conservation (Natural Habitats, & c) Regulations 2004 | |
| National park authorities | The National Parks (Scotland) Act 2000 | |
| British Waterways (Scottish Canals) | The Transport Act 1962 | |
| | The British Waterways Act 1995 | |
| Forestry Commission Scotland | The Forestry Act 1967 | |

**Table A8.3: Co-ordinated approach – all public bodies and office-holders**

| **Duty to have regard to the river basin management plan**<br>[Under Water Environment and Water Services (Scotland) Act 2003] |
|---|

**Table A8.4: Partnership approach – co-ordinating and advisory groups**

| Group | Membership | Role |
|---|---|---|
| National Advisory Group | Scottish Government;<br>SEPA;<br>Responsible authorities;<br>Stakeholder representatives. | Assists with the identification of national priorities for environmental improvement and protection and advises on the need for national measures to deliver nationally agreed standards. |
| Diffuse Pollution Management Advisory Group | Cross section of rural, environmental and biodiversity interests. | Provides a coordination framework for the delivery of rural diffuse pollution actions in Scotland. |
| Statutory Group on Non-Native Species | Scottish Natural Heritage;<br>Scottish Government;<br>SEPA;<br>Forestry Commission Scotland;<br>Science and Advice for Scottish Agriculture. | Oversees the use of statutory powers relating to non-native species and coordinates work between the statutory bodies with specific responsibilities for non-native species. |
| Non-native species action group | Scottish Government, relevant public bodies and non-government organisations. | Coordinates overall response of the public sector and other bodies to the risk posed by invasive non-native species in Scotland. |
| SUDS Working Party | Scottish Government;<br>SEPA;<br>Relevant responsible authorities;<br>Scottish Enterprise;<br>Representative bodies for builders and architects. | Coordinates work on sustainable urban drainage systems for reducing pollution and flooding. |
| Fish and Fisheries Advisory Group | Scottish Government;<br>SEPA;<br>Scottish Natural Heritage;<br>National stakeholder organisations with interests in fish or fisheries. | Advises on assessment of fish stocks, status of fish stocks, improvement and protection priorities for fish stocks, and research needs. |

**Table A8.4: Partnership approach – co-ordinating and advisory groups continued**

| Group | Membership | Role |
|---|---|---|
| Argyll and Lochaber Area Advisory Group<br>Clyde Area Advisory Group<br>Forth Area Advisory Group<br>North East Area Advisory Group<br>North Highland Area Advisory Group<br>Orkney Area Advisory Group<br>Outer Hebrides Area Advisory Group<br>Shetland Area Advisory Group<br>Tay Area Advisory Group | SEPA;<br>Relevant responsible authorities;<br>Organisations and groups with interest in pressures on the environment in the area. | Advise and support identification of local priorities and measures to protect and improve the water environment in the area. |
| The Metropolitan Glasgow Strategic Drainage Partnership | Glasgow City Council;<br>Scottish Water;<br>SEPA;<br>Clyde Gateway;<br>East Dunbartonshire Council;<br>Renfrewshire Council;<br>Scottish Canals;<br>Scottish Enterprise;<br>Glasgow and the Clyde Strategic Development Planning Authority;<br>Scottish Government. | Integrated approach to sewerage and drainage master planning for the city of Glasgow. |
| Scottish Coastal Forum | Members are coastal forum partnerships of public bodies and businesses. | Strategic planning and management frameworks for coastal areas. |
| Dee Catchment Partnership | Public bodies, research institutions, land managers, businesses and voluntary organisations. | Helping coordinate action to protect and improve the River Dee, North East Scotland. |
| The River South Esk catchment Partnership | Public bodies, land managers, voluntary organisations, research institutions and businesses. | Helping coordinate action to protect and improve the River South Esk, Angus. |
| Spey Catchment Initiative | Public bodies, voluntary organisations, businesses and land managers. | Help protect and enhance the River Spey catchment. |
| River Isla Catchment Initiative | Forestry commission Scotland;<br>SEPA. | Reducing diffuse pollution through woodland management. |
| Highland Invasive Species Forum | Highland Council;<br>A range of other public body and non-government organisations. | Co-ordinating action on invasive species in the Highland region of Scotland. |

**Table A8.4: Partnership approach – co-ordinating and advisory groups continued**

| Group | Membership | Role |
|---|---|---|
| Central Scotland Green Network Trust | Scottish Government;<br>Director for Environment and Forestry;<br>Convention of Scottish Local Authorities;<br>Forestry Commission Scotland;<br>Scottish Natural Heritage;<br>SG Architecture and Place Division;<br>SG Housing Supply Division;<br>SG Public Health Division;<br>SG Housing Services & Regeneration Division;<br>Transport Scotland;<br>CSGNT Board. | Delivery across Central Scotland of a high-quality 'green network' that will meet a number of environmental, social and economic goals designed to improve people's lives, promote economic success, allow nature to flourish (including that dependent on the water environment) and help Scotland respond to the challenge of climate change. |
| Glasgow and Clyde Valley Green Network Partnership | Eight regional local authorities in the Glasgow and Clyde Valley area;<br>Forestry Commission Scotland;<br>SEPA;<br>Scottish Enterprise;<br>Scottish Natural Heritage;<br>Glasgow Centre for Population Health. | Working to change the face of Central Scotland through a programme of strategic greenspace enhancements designed to promote healthier lifestyles, better environments, greater biodiversity, stronger communities and economic opportunity. |

**Table A8.5: Co-ordination - supplementary plans and planning frameworks**

| Topic | Plan or planning framework | Primary responsibility |
|---|---|---|
| Physical condition | Improving the physical condition of Scotland's water environment | Scottish Government;<br>SEPA |
| Rural diffuse pollution | Rural diffuse pollution plan for Scotland | Diffuse Pollution Management Advisory Group |
| Invasive non-native species | The Great Britain Invasive Non-native Species Strategy | Department for Environment, Food & Rural Affairs;<br>Scottish Government;<br>Welsh Government |
| | Managing invasive non-native species in Scotland's water environment: A supplementary plan to the river basin management plans | SEPA;<br>Scottish Government;<br>Forestry Commission Scotland;<br>Scottish Natural Heritage |

**Table A8.5: Co-ordination - supplementary plans and planning frameworks continued**

| Topic | Plan or planning framework | Primary responsibility |
|---|---|---|
| Invasive non-native species | Biosecurity Plan for the Shetland Islands | NAFC Marine Centre, University of the Highlands and Islands |
| | Marine invasive non-native species in the Solway | Solway Firth Partnership |
| | Biosecurity Plan for the Firth of Clyde | Firth of Clyde Forum |
| Freshwater flows and levels | Water Scarcity Plan | SEPA |
| Urban waste water and urban drainage-related pressures | Planning advice note (PAN) 79: water and drainage<br><br>Planning advice note (PAN) 61: Planning and Sustainable Urban Drainage Systems<br><br>Planning Guide: The Development Plan Process: A guide to considering Water and Waste Water Services | Scottish Government |
| Urban drainage-related pressures | Glasgow Strategic Drainage Plan | Glasgow City Council;<br>Scottish Water;<br>SEPA;<br>Clyde Gateway;<br>East Dunbartonshire Council;<br>Renfrewshire Council;<br>Scottish Canals;<br>Scottish Enterprise;<br>Glasgow and the Clyde Strategic Development Planning Authority;<br>Scottish Government. |
| Forestry-related pressures | Land management plans | Forestry Commission Scotland |
| Aquaculture-related pressures (including on wild fish) | A Fresh Start: The renewed strategic framework for Scottish aquaculture | Scottish Government |
| | Scottish Planning Policy: SPP 22: Planning for Fish Farming | Scottish Government |
| | Locational guidelines: Marine Fish Farms in Scottish Waters | Scottish Government |
| Eel management | Eel Management Plan for Scotland | Department of Environment Food and Rural Affairs |

**Table A8.5: Co-ordination - supplementary plans and planning frameworks continued**

| Topic | Plan or planning framework | Primary responsibility |
|---|---|---|
| General marine issues | National Marine Plan | Scottish Government |
| | Shetland's Marine Spatial Plan | Shetland Islands Council; University of the Highlands and Islands |
| | Firth of Clyde Marine Spatial Plan | Firth of Clyde Forum |
| Reducing diffuse pollution and improving water quality | Opportunity mapping for woodland creation to improve water quality and reduce flood risk in the River Tay catchment – a pilot for Scotland | Forestry Commission Scotland |

## Measures

**Table A8.6: Measures to protect and improve water quality - point source discharges**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls on point source discharges liable to cause pollution | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| | | Marine (Scotland) Act 2010 | Scottish Ministers (Marine Scotland) |
| | | The Merchant Shipping (Prevention of Pollution)(Limits) Regulations 2014<br>The Merchant Shipping (Prevention of Pollution by Sewage and Garbage from Ships) Regulations 2008<br>The Merchant Shipping (Pollution) Act 2006<br>The Merchant Shipping Act 1995 | Maritime and Coastguard Authority |
| | | Food and Environment Protection Act 1995 | Scottish Ministers (Marine Scotland) |
| Basic | Prohibition of direct discharges of pollutants into groundwater | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |

**Table A8.6: Measures to protect and improve water quality - point source discharges continued**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures to secure compliance with the Integrated Pollution Prevention and Control Directive | The Pollution Prevention and Control (Scotland) Regulations 2012 | SEPA |
| Basic | Measures to secure compliance with the Urban Waste Water Treatment Directive | Urban Waste Water Treatment (Scotland) Regulations 1994 | Scottish Ministers, SEPA |
| | | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| Basic | Measures to secure compliance with the Priority Substances Directive | Delivered through implementation of other basic measures for point sources | As above |
| Supplementary | Economic instrument | Quality and Standards Programme (publically-funded programme of investment by Scottish Water) | Scottish Ministers; Scottish Water |
| Supplementary | Education project | Planning Advice Note (PAN) 50: controlling the environmental effects of surface mineral workings | Local authorities |
| Supplementary | Codes of good practice | Good practice for decommissioning redundant boreholes and wells | SEPA |

**Table A8.7: Measures to protect and improve water quality - rural diffuse sources**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls on diffuse sources liable to cause pollution | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| | | The Plant Protection Products (Sustainable Use) Regulations 2012 | Scottish Ministers |
| Basic | Measures to secure the best environmental practices required under the Nitrates Directive to control nitrate pollution from agricultural sources | The Protection of Water Against Agricultural Nitrate Pollution (Scotland) Regulations 1996<br>The Action Programme for Nitrate Vulnerable Zones (Scotland) Regulations 2008 | Scottish Ministers |

**Table A8.7: Measures to protect and improve water quality - rural diffuse sources continued**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures required by the Plant Protection Products Directive | The Plant Protection Products Regulations 2011 | Scottish Ministers |
| Basic: | Measures required by the Sewage Sludge Directive | The Sludge (Use in Agriculture) Regulations 1989 | SEPA |
| Basic | Measures to secure compliance with the Priority Substances Directive | Delivered through implementation of other basic measures for diffuse sources | As above |
| Supplementary | Educational project | Priority catchment diffuse pollution management awareness campaign | SEPA |
| | | Farming and Water Scotland | Scottish Ministers; Scotland's Rural College; SEPA; DPMAG; National Farmers Union Scotland. |
| | | Constructed Farm Wetlands: design Manual for Scotland and Northern Ireland | SEPA |
| | | Nitrate vulnerable zone guidance for farmers | Scottish Government |
| | | Nitrogen limit for crop type calculator for nitrate vulnerable zones | Scottish Government |
| | | Nutrient management decision support tool for farmers and advisors | Scottish Government |

**Table A8.7: Measures to protect and improve water quality - rural diffuse sources continued**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Supplementary | Educational project | The Voluntary Initiative: Promoting Responsible Pesticide Use | Wide range of government administrations, government agencies, farming unions, voluntary environmental organisations and businesses with agricultural interests. |
| | | NetRegs: Advice on septic tanks | SEPA |
| | Legislative instrument | The Forestry Act 1967 (control of tree felling) | Forestry Commission Scotland |
| | Economic instruments | Scottish Rural Development Programme | Scottish Ministers |
| | | The Common Agricultural Policy (Cross-Compliance) (Scotland) Regulations 2014 (Good Agricultural and Environmental Conditions) | Scottish Ministers |
| | | Scottish Water Sustainable Land Management Incentive Scheme | Scottish Water |
| | Codes of good practice | UK Forestry Standard Forest & Water Guidelines | Forestry Commission |
| | | Prevention of Environmental Pollution from Agricultural Activity: A code of good practice | Scottish Ministers |
| | | Code of Practice for Using Plant Protection Products in Scotland | Scottish Ministers |
| | | The 4 Point Plan | Scottish Ministers |
| | | Code of Practice: A Guide for Users of Sewage Treatment Systems | British Water |
| | | Sheep dipping code of practice for Scottish farmers, crofters and contractors | SEPA |

**Table A8.8: Measures to protect and improve water quality - urban diffuse sources**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls on diffuse sources liable to cause pollution | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| Basic | Measures to secure compliance with the Priority Substances Directive | Delivered through implementation of other basic measures for diffuse sources | SEPA |
| Supplementary | Educational project | Sustainable urban drainage system – national design manual<br>The SUDS Manual | Construction Industry Research and Information Association |
| | | Sustainable urban drainage system – good practice design<br>SUDS for roads | SUDS Working Party;<br>Society of Chief Officers of Transportation in Scotland. |
| | | Surface water action plans | Scottish Water |
| | | Planning advice note (PAN) 61: Planning and sustainable urban drainage systems | Local authorities |
| | Legislative instruments | Dog Fouling (Scotland) Act 2003 | Local authorities |

**Table A8.9: Measures to protect and improve water quality - diffuse acid deposition**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls on diffuse sources liable to cause pollution | The Pollution Prevention and Control (Scotland) Regulations 2012 | SEPA |
| Supplementary | Various | For information on other measures see: Emissions of air pollutants in the UK, 1970 to 2013 | |
| Supplementary | Codes of good practice | UK Forestry Standard Forest & Water Guidelines (good practices forest management in catchments at risk from acid rain) | Forestry Commission Scotland |
| Supplementary | Legislative | The Forestry Act 1967 (control of tree felling) | Forestry Commission Scotland |
| Supplementary | Economic | Forestry Grant Scheme | Scottish Government; Forestry Commission Scotland |

**Table A8.10: Measures to protect and improve water quality - legacy sources**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| **Contaminated ground** | | | |
| Basic | Measures to control discharges of pollutants to groundwater or surface waters from contaminated ground | Environmental Protection Act 1990; Contaminated Land (Scotland) Regulations 2000 | Local authorities; SEPA |
| | | The Radioactive Contaminated Land (Scotland) Regulations 2007 | SEPA |
| | | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| Supplementary | Legislative instrument | Town & Country Planning (Scotland) Act 1997 (conditions on site development) | Local authorities |
| Supplementary | Education project | Planning Advice Note (PAN) 33: Development of contaminated land | Scottish Government |
| **Mine water** | | | |
| Supplementary | Other: Management agreements | Mining legacy management | Coal Authority |

**Table A8.11: Measures to protect and improve water quality - general pollution prevention measures**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures required under the Major Accidents Directive | Control of Major Accident Hazards Regulations 2015 | SEPA; Health and Safety Executive |
| Basic | Measures to prevent significant losses of pollutants from technical installations, and to prevent and/or to reduce the impact of accidental pollution incidents | Control of Major Accident Hazards Regulations 2015 | SEPA; Health and Safety Executive |
| | | The Pollution Prevention and Control (Scotland) Regulations 2012 | SEPA |
| | | The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003 | SEPA |
| | | The Water Environment (Oil Storage) (Scotland) Regulations 2006 | SEPA |
| | | The Flood Risk Management (Scotland) Act 2009 (Flood warning system) | SEPA |
| | | The Environmental Liability (Scotland) Regulations 2009 | SEPA |
| Supplementary | Legislative instrument | The Building (Scotland) Regulations 2004 (design, construction and drainage requirements for buildings) | Local authorities |
| Supplementary | Other: Emergency response plans | National Contingency Plan for responses to marine pollution | Scottish Ministers; Maritime and Coastguard Agency |
| Supplementary | Educational projects | Oil care campaign | Partnership of government agencies, professional bodies, businesses and trade associations. |
| | | Pollution prevention guidelines | SEPA |

**Table A8.11: Measures to protect and improve water quality - general pollution prevention measures continued**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Supplementary | Educational projects | Silt control guidance: preventing pollution while dredging | SEPA |
| Supplementary | Codes of good practice | Underground storage tanks for liquid hydrocarbons: Code of Practice for Installers, Owners and Operators of Underground Storage Tanks (& Pipelines) | SEPA |

**Table A8.12: Measures to protect and improve water quality – additional source control measures**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Supplementary | Legislative instrument | The Detergent Regulations 2010 (limits on inorganic phosphate content of laundry detergents) | UK Government |
| | | Sewerage (Scotland) Act 1968 (control of pollutants discharged into the public sewer) | Scottish Water |
| | | The REACH Enforcement Regulations 2008 | SEPA; Health and Safety Executive |
| | | EU Biocides Regulation 2012; The Biocidal Products and Chemicals (Appointment of Authorities and Enforcement) Regulations 2013 | Scottish Ministers |

**Table A8.13: Steps taken to avoid increased pollution of marine waters**

| | | |
|---|---|---|
| The measures we are taking to protect and improve the condition of water bodies and protected areas in the district do not involve increasing pollution of marine waters.<br><br>Pollution of marine waters would only increase if, in order to achieve our objectives, pollutants were disposed of in those waters. The steps we have in place to prevent this are detailed below | | |
| **Means by which marine waters could be affected** | **Steps to prevent pollution of marine waters** | **Details** |
| Disposal of pollutants in marine waters via long sea outfall pipes | The seaward limit of coastal water bodies is a minimum of 3 nautical miles (5,556 metres) from the shore. Along large parts of the district's coast, the limit is even further offshore. | • Water Environment and Water Services (Scotland) Act 2003<br>• Annex 1: Map of the river basin district |
| | No outfall pipes extend beyond the seaward limits of coastal waters<br>All inputs of pollutants into coastal waters are controlled to achieve the objectives of the water bodies concerned. | • See controls listed in Table A8.6 above |
| | Our controls on pollution extend beyond the seaward limit of coastal waters to protect marine waters from pollution. | • Marine (Scotland) Act 2010<br>• Food and Environment Protection Act 1995 |
| Transport of pollutants by vessel for disposal in marine waters | Our controls on pollution include pollution caused by dumping at sea and extend beyond the seaward limit of coastal waters to protect marine waters from pollution. | • Marine (Scotland) Act 2010<br>• Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter |

**Table A8.14: Measures to protect and improve water flows and levels**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls over the abstraction of fresh surface water and groundwater, and impoundment of fresh surface water | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| Basic | Controls on artificial recharge or augmentation of groundwater bodies. | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| Supplementary | Economic instrument | Quality and Standards Programme (publically-funded programme of investment by Scottish Water) | Scottish Ministers; Scottish Water |
| | | Scottish Rural Development Programme (funding support for storage ponds for irrigation) | Scottish Ministers |
| Supplementary | Educational project | Guidance for developers of run-of-river hydropower schemes (guide to suitable locations and expected mitigation)<br>Scottish Government online renewables advice: Hydro schemes | SEPA |

**Table A8.15: Measures to avoid the creation of, and remove, barriers to fish migration**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls over the impoundment of fresh surface water | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| Supplementary | Legislative instrument | The Water Environment (Remedial Measures) (Scotland) Regulations 2015 (in prep.) | SEPA |
| Supplementary | Economic instrument | Publically-funded Water Environment Fund for improvements to the physical condition of water bodies | SEPA |
| Supplementary | Educational project | Guidance for developers of run-of-river hydropower schemes (guide to suitable locations and expected mitigation) | SEPA |

**Table A8.16: Measures to protect and improve physical condition**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls on morphological alterations | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| | | Marine (Scotland) Act 2010 | Scottish Ministers |
| Supplementary | Legislative instrument | The Water Environment (Remedial Measures) (Scotland) Regulations 2015 (in prep.) | SEPA |
| Supplementary | Economic instrument | Publically-funded Water Environment Fund for improvements to the physical condition of water bodies | SEPA |
| | | Scottish Rural Development Programme | Scottish Ministers |
| | | Forestry Grant Scheme | Scottish Ministers; Forestry Commission Scotland |
| Supplementary | Codes of good practice | UK Forestry Standard Forest & Water Guidelines (good practices in forest management) | Forestry Commission Scotland |
| Supplementary | Educational projects | Dredging – a land manager's guide to the rules | SEPA |
| | | Engineering in the water environment good practice guide: Bank protection rivers and lochs | SEPA |
| | | Engineering in the water environment good practice guide: River crossings | SEPA |
| | | Engineering in the water environment good practice guide: Sediment management | SEPA |
| | | Engineering in the water environment good practice guide: Intakes and outfalls | SEPA |

**Table A8.16: Measures to protect and improve physical condition continued**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Supplementary | Educational projects | Engineering in the water environment good practice guide: Temporary construction methods | SEPA |
| | | Engineering in the water environment good practice guide: Riparian vegetation management | SEPA |
| | | Managing river habitats for fisheries | SEPA |
| Supplementary | Projects to demonstrate good practice and improvement in the physical water environment | Pilot catchment projects | SEPA; Other partners |

**Table A8.17: Measures to prevent and mitigate the impacts of invasive non-native species or the spread of disease**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Controls on invasive non-native species | Wildlife & Countryside Act 1981 | SEPA; Scottish Natural Heritage; Forestry Commission Scotland; Scottish Ministers (Marine Scotland); Police Scotland |
| | | Aquaculture and Fisheries (Scotland) Act 2007 | Scottish Ministers |
| | | The Alien and Locally Absent Species in Aquaculture (Scotland) Regulations 2015 | Scottish Ministers |
| Supplementary | Emergency response plans | Gyrodactylus salaris contingency plan | Scottish Ministers |
| Supplementary | Legislative instrument | Aquaculture and Fisheries (Scotland) act 2007 (including control of sea lice and prevention of fish escapes | Scottish Ministers |

**Table A8.17: Measures to prevent and mitigate the impacts of invasive non-native species or the spread of disease continued**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Supplementary | Technical standards | A technical standard for Scottish finfish aquaculture (standards to prevent escapes into the wild of farmed fish) | Scottish Ministers |
| Supplementary | Codes of good practice | Non-native Species Code of Practice | Scottish Ministers |
| | | Code of Practice to Avoid the Introduction of *Gyrodactylus salaris* to GB | Scottish Ministers |
| Supplementary | Other relevant measures | Invasive species biosecurity programmes | Rivers and Fisheries Trusts Scotland |
| | | Invasive species biosecurity programme | Firth of Clyde Forum |
| Supplementary | Education project | Information for the aquaculture industry | NAFC Marine Centre, University of the Highlands and Islands |
| | | Information for marinas and marine users | NAFC Marine Centre, University of the Highlands and Islands |

**Table A8.18: Specific measures to help conserve wild fish stocks**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Supplementary | Legislative instrument | The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 | Police Scotland; Water Bailiffs |
| | | The Conservation of Salmon (River Annan Salmon Fishery District) (Scotland) Regulations 2012 | |
| | | The Conservation of Salmon (Annual Close Times and Catch and Release) (Scotland) Regulations 2014 | |
| | | The Freshwater Fish Conservation (Prohibition of Fishing for Eels) (Scotland) Regulations 2008 | |

**Table A8.19: Specific measures for assessing the environmental risk posed by certain development projects**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures to transpose the requirements of the Environmental Impact Assessment Directive | The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 | Local authorities |
| | | The Environmental Impact Assessment (Agriculture) (Scotland) Regulations 2006 | Scottish Ministers |
| | | The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 | Scottish Ministers |
| | | The Roads (Scotland) Act 1984 | Scottish Ministers |
| | | Water Environment (Controlled Activities) (Scotland) Regulations 2011 (in relation to irrigation projects for agriculture) | SEPA |
| | | The Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 | Forestry Commission Scotland |

**Table A8.20: Measures for protected areas for the conservation of internationally important species and habitats**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures to contribute to the achievement of the objectives of the Habitats Directive | Part 2 of the Nature Conservation (Scotland) Act 2004;<br>The Conservation (Natural Habitats &c) Regulations 1994;<br>Wildlife and Countryside Act 1981 | Scottish Natural Heritage;<br>Scottish Ministers; SEPA;<br>Police Scotland |
| Basic | Measures to contribute to the achievement of the objectives of the Birds Directive | Part 2 of the Nature Conservation (Scotland) Act 2004;<br>The Conservation (Natural Habitats &c) Regulations 1994;<br>Wildlife and Countryside Act 1981 | Scottish Natural Heritage;<br>Scottish Ministers; SEPA;<br>Police Scotland |
| Supplementary | Education project | Farming, SSSIs and Natura sites | National Farmers' Union Scotland;<br>Scottish Natural Heritage |
| Supplementary | Education and economic instrument | LIFE funded project to restore habitat for freshwater pearl mussels – pearls in peril | Scottish Natural Heritage; Other public bodies;<br>Voluntary organisations |

**Table A8.21: Measures for bathing water protected areas**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures to secure the achievement of the objectives for Bathing Water Protected Areas | Bathing Waters (Scotland) Regulations 2008; The Bathing Waters (Sampling and Analysis) (Scotland) Regulations 2008 | Scottish Ministers; SEPA |
| | | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |

**Table A8.22: Measures for drinking water protected areas**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures to protect drinking water sources | The Water Environment (Drinking Water Protected Areas (Scotland) Order 2013 | Scottish Ministers |
| | | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |

**Table A8.23: General measures to facilitate the protection and improvement of the water environment**

| Measure type | Measure | How it is delivered | Primary responsibility |
|---|---|---|---|
| Basic | Measures to recover the cost of water services | Water supply and sewerage charges | Water Industry Commission for Scotland Scottish Water |
| Basic | Water pricing policies | Price setting for the water industry | Water Industry Commission for Scotland |
| Basic | Measures to promote an efficient and sustainable water use | Water Environment (Controlled Activities) (Scotland) Regulations 2011 | SEPA |
| Supplementary | Education project – efficient and sustainable water use | Water efficiency advice and efficiency plan | Scottish Water |
| Supplementary | | NetRegs: water use efficiency guide | SEPA |

## Climate check of the measures for addressing the most widespread pressures

We have undertaken climate checks of the types of action that may be used to address the most widespread pressures on the water environment. The results of the checks are presented in the summaries below. The assessments give a general indication of any likely significant implications of different on-the-ground actions in terms of:

**A.** greenhouse gas emissions;
**B.** preparing Scotland for a future climate (e.g. whether the action will help us better cope economically, environmentally or socially with hotter, drier summers, etc.);
**C.** the action's continued effectiveness under Scotland's predicted future climate.

The considerations that the checks were based on are further described in Table A8.24, together with keys for interpreting the results.

We will use the outcome of the check to advise those taking action on whether a solution is likely to:

- contribute to meeting the challenges of climate change;
- need to be designed with Scotland's future climate in mind if its effectiveness is to be maintained;
- have one or more negative effects in terms of greenhouse gas emissions or preparing Scotland for a future climate. Where such actions are necessary to achieve our objectives, we will work to ensure that their negative effects are minimised as far as possible and balanced by the overall benefits of improving the water environment.

**Table A8.24: Considerations on which the climate check is based**

| A. Greenhouse gas emissions | B. Preparing Scotland for a future climate | C. Action's continued effectiveness under a changed climate |
|---|---|---|
| • Will the solutions lead to an increase or decrease in greenhouse gas emissions?<br><br>• Will the action help capture carbon in the soil or in vegetation?<br><br>• Will the action reduce energy use in the long-term? | **Flood risk**<br>• Will the action increase or decrease flood risks under wetter winters, more intense rainfall and higher sea levels?<br><br>**Drought**<br>• Will the action help us maintain water uses in periods of drought caused by hotter, drier summers?<br><br>**Ecosystem services**<br>• Will the action make wildlife more or less resilient to a changed climate?<br>• Will the action help sustain economically important water uses in a changed climate (e.g. fisheries, tourism, agriculture, etc.)?<br>• Will the action enable the water environment to continue to recycle our wastes under a changed climate? | • Will the action remain effective under:<br>– wetter winters<br>– more intense rainfall?<br>– drier summers?<br>– higher sea levels?<br><br>• If not, can it be easily adapted in the future so that it is effective? |

**Table A8.24: Considerations on which the climate check is based continued**

| Key to A | | | Key to B | | | Key to C | | |
|---|---|---|---|---|---|---|---|---|
| Net emissions reduced | Net emissions increased | No likely significant change either way | Expected to make us better prepared | May make us less able to cope | No likely significant effect | Resilient and unlikely to need adapting or very flexible | Resilient but may need to be adapted or supplemented | Not resilient or easily adapted |

**Table A8.25: Measures to address rural diffuse pollution**

| Climate check of: | A: Greenhouse emissions | B: Preparing Scotland for a future climate | | | | | C: Action's continued effectiveness |
|---|---|---|---|---|---|---|---|
| | | flood risk | drought | Ecosystem services | | | |
| | | | | Biodiversity | Economic | Recycling wastes | |
| **Action** manage inputs to land | reduced emissions of nitrous oxide and from fertiliser manufacture | improved soil management - increased rainwater infiltration and retention | improved soil management - slowed rainwater run-off | - | - | - | Action expected to be resilient |
| **Action** intercept and store/treat | carbon sequestration in buffer zone soils and vegetation | buffer slows rate of run-off | water retention in wetlands and groundwater for slow release | expansion of habitats (ponds, wetlands) increase resilience | - | - | May need to design for future climate (e.g. higher sea levels; more intense rainfall) |
| **Outcome** improved water quality | reduced drinking water treatment needed downstream | - | - | reduced stress - increased resilience of sensitive species | reduced stress - helps sustain fisheries, quality for tourism, etc. | reduced stress - helps system maintain service | |

**Table A8.26: Measures to address waste water discharges**

| Climate check of: | A: Greenhouse emissions | B: Preparing Scotland for a future climate | | | | | C: Action's continued effectiveness |
|---|---|---|---|---|---|---|---|
| | | flood risk | drought | Ecosystem services | | | |
| | | | | Biodiversity | Economic | Recycling wastes | |
| **Action** reduce pollutant content of sewage at source | less waste and hence less loss of embedded energy; reduced end-of-pipe treatment | - | - | - | - | - | Action expected to be resilient |
| **Action** collect and treat: improve sewer network; increase treatment | energy costs of pumping and treatment - unless tertiary treatment in wetlands | Will benefit flood risk management if involves major upgrades to combined sewers | - | - | - | - | Action expected to be resilient |
| **Action** collect and treat: separate out rainwater run-off | reduced pumping; carbon sequestration | slowed rate of run-off | water retention for slow release | expansion of habitats (ponds, wetlands) increase resilience | | | May need to design for future climate (e.g. to sea level rise, more intense rainfall) |
| **Outcome** improved water quality | - | - | - | reduced stress - increased resilience of sensitive species | reduced stress - helps sustain fisheries, quality for tourism, etc. | reduced stress - helps system maintain service | |

**Table A8.27: Measures to improve physical condition - bank and shore vegetation**

| Climate check of: | A: Greenhouse emissions | B: Preparing Scotland for a future climate | | | | | C: Action's continued effectiveness |
|---|---|---|---|---|---|---|---|
| | | flood risk | drought | Ecosystem services | | | |
| | | | | Biodiversity | Economic | Recycling wastes | |
| **Actions and outcome** Improved bank and shore vegetation | increased carbon sequestration in vegetation and soils | banks and shores more resistant to erosion and slow flood waters down | - | better food supply + shading reduces thermal stress; expansion of bank and shore habitats; healthy vegetation likely to be more resistant to invasion by non-native species | reduced stress - helps sustain wild fisheries, quality for tourism, etc. | reduced stress - helps system maintain service | Actions expected to be resilient |

**Table A8.28: Measures to improve physical condition – addressing structural modifications**

| Climate check of: | A: Greenhouse emissions | B: Preparing Scotland for a future climate | | | | | C: Action's continued effectiveness |
|---|---|---|---|---|---|---|---|
| | | flood risk | drought | Ecosystem services | | | |
| | | | | Biodiversity | Economic | Recycling wastes | |
| **Action** Reduce maintenance | less maintenance reduces energy usage | - | - | expansion of bank, shore and floodplain habitats increases resilience | - | - | Action expected to be resilient |
| **Action** Low and high level interventions | Short-duration increased energy usage during intervention | - | - | expansion of bank, shore and floodplain habitats increases resilience | - | - | Action expected to be resilient[4] |
| **Outcome** Improved bed, bank and shore physical characteristics | - | River flows slowed and re-connected with un-developed flood plains | - | reduced stress - (e.g. narrowing of over-wide channels) increases resilience of sensitive species | reduced stress - helps sustain wild fisheries, quality for tourism, etc. | reduced stress - helps system maintain service | |

**Table A8.29: Measures to remove barriers to fish migration**

| Climate check of: | A: Greenhouse emissions | B: Preparing Scotland for a future climate | | | | | C: Action's continued effectiveness |
|---|---|---|---|---|---|---|---|
| | | flood risk | drought | Ecosystem services | | | |
| | | | | Biodiversity | Economic | Recycling wastes | |
| **Action** Install fish passes | short-duration increase in energy usage during construction | - | Possible increased flow releases from water storage reservoirs to operate fish pass | - | - | - | Action expected to be resilient |
| **Action** Remove non-operational dams, weirs and other structures | End of on-going maintenance requirements reduces energy usage | may reduce flood risk by preventing water backing up (e.g. at culverts) | - | - | - | - | Action expected to be resilient |
| **Outcome** Improved access for migratory fish | - | - | - | expanded fish populations increases resilience | reduced stress - helps sustain wild fisheries, quality for tourism, etc. | - | |

[4] Assumes that consideration is given to future rainfall patterns (e.g. more frequent intense storms) when designing action for engineering modifications serving a flood protection function.

**Table A8.30: Measures to improve flows and levels - hydropower schemes**

| Climate check of: | A: Greenhouse emissions | B: Preparing Scotland for a future climate | | | | | C: Action's continued effectiveness |
|---|---|---|---|---|---|---|---|
| | | flood risk | drought | Ecosystem services | | | |
| | | | | Biodiversity | Economic | Recycling wastes | |
| **Action** Provide improved river flows by integrated operation of scheme; changing pattern of abstraction | unless new generator installed on dam and powered by additional releases | - | - | - | - | - | Action expected to be resilient |
| **Action** Provide improved river flows by reducing net abstraction | less water for generation | - | | - | - | - | Action expected to be resilient |
| **Outcome** Improved water flows and levels | - | - | more water in rivers and flows maintained for longer | reduced stress - increased resilience of sensitive species | reduced stress - helps sustain wild fisheries, quality for tourism, etc. | reduced stress - helps system maintain service | |

**Table A8.31: Measures to improve flows and levels – drinking water supply**

| **Preliminary climate check of planned action to reduce pressures from drinking water supply on water flows and levels** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Climate check of:** | **A: Greenhouse emissions** | **B: Preparing Scotland for a future climate** | | | | | **C: Action's continued effectiveness** |
| | | **flood risk** | **drought** | **Ecosystem services** | | | |
| | | | | **Biodiversity** | **Economic** | **Recycling wastes** | |
| **Action** Reduce leakage rates in water supply network | less water unnecessarily treated and pumped | - | - | - | - | - | may need to be supplemented due to increased demand |
| **Action** Increase water use efficiency | less water treated and pumped | - | - | - | - | - | may need to be supplemented due to increased demand |
| **Action** Increase supply capacity | uncertain - depends on whether pumping and purification treatment would increase or decrease | integrated system has flexibility to store flood waters | - | - | - | - | may need to design for changed rainfall pattern and increased demand |
| **Outcome** Improved water flows and levels | - | - | more water in rivers - flows maintained for longer | reduced stress - increased resilience of sensitive species | reduced stress - helps sustain wild fisheries, quality for tourism, etc. | reduced stress - helps system maintain service | |

**Table A8.32: Measures to improve flows and levels – agricultural land irrigation**

| Climate check of planned action to reduce pressures from irrigation abstractions | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Climate check of:** | **A: Greenhouse emissions** | **B: Preparing Scotland for a future climate** | | | | | **C: Action's continued effectiveness** |
| | | **flood risk** | **drought** | **Ecosystem services** | | | |
| | | | | **Biodiversity** | **Economic** | **Recycling wastes** | |
| **Action** Reduce demand | less water pumped due to more efficient use; improved carbon sequestration in soils due to good soil management | - | more water stored in soils for slow release | - | - | - | Action expected to be resilient and flexible as climate changes |
| **Action** Change timing of abstraction | - | - | - | expansion of habitats (storage ponds) increases resilience | - | - | may need to design ponds for increased demand |
| **Action** Provide supply from other sources | uncertain - depends on whether pumping increases or decreases | - | - | - | - | - | Action expected to be resilient and flexible as climate changes |
| **Outcome** Improved water flows and levels | - | - | more water in rivers in dry weather | reduced stress - increased resilience of sensitive species | reduced stress - helps sustain wild fisheries, quality for tourism, etc. | reduced stress - helps system maintain service | |

# Appendix 9: Cost recovery

This appendix outlines the practical steps and measures taken to apply the principle of recovery of the costs of water use in accordance with Article 9 of the Water Framework Directive.

## Introduction

River basin management planning will deliver the long-term sustainability of our rivers, lochs, coasts and groundwater, with all water users and responsible bodies playing their part in the achievement of our aims and objectives stated elsewhere in this plan.

It is recognised that a wide variety of mechanisms and measures will be required to ensure this approach is successful. Water pricing policies can make a valuable contribution to the sustainable management of our water resources. These can act as an incentive to reduce pollution and improve the efficiency of water usage. They can also help to ensure that available resources are effectively allocated between water uses.

We have taken steps to introduce such policies, in accordance with the polluter pays principle, as one element of our integrated WFD implementation programme. These various components, taken as a whole, aim to achieve the Directive's requirements.

In developing the approach to cost recovery, the likely social, environmental and economic effects of such recovery have been taken into account, as well as the geographic and climatic conditions of the Scotland river basin district.

## Description of steps taken

Practical approaches to incorporating water pricing policies within our implementation framework have been introduced. There are two key mechanisms for the recovery of costs in respect of water use. These relate to:

- the provision of water services by our public water authority;
- our control regime for ensuring sustainable water use across the environment.

### Provision of water services by our public water authority

Our water and sewerage services provider, Scottish Water, is a publicly owned body and a responsible authority under the Water Environment and Water Services (Scotland) Act 2003. As a responsible authority, Scottish Water must exercise its water supply and sewerage functions to enable the achievement of our environmental objectives as required by the Water Framework Directive. Scottish Water operates within a regulatory framework established by the Scottish Parliament. In this framework Scottish Ministers, acting on behalf of the people of Scotland, set the objectives for the industry to be delivered at the lowest overall reasonable cost to customers. Key players in the regulatory framework are Scottish Water's economic regulator, the Water Industry Commission for Scotland, the customer representative bodies, Consumer Advice Scotland and the Scottish Public Services Ombudsman, the quality regulators, the Drinking Water Quality Regulator and SEPA.

The costs of providing water supply and sewerage services are fully recovered by Scottish Water through customer charges. This includes the recovery of charge revenue from households as well as non-household customers, including businesses and agriculture. To extend WFD principles to Scottish Water customers, the Water Services etc. (Scotland) Act 2005 set up an independent economic regulator, the Water Industry Commission for Scotland. It is this body that determines the financial resources required by Scottish Water to deliver all of its public policy objectives, including environmental objectives, and the charges that it can set. The principles according to which charges should be determined over every regulatory control period are set down by Scottish Ministers. Their statement for the current regulatory control period 2015 – 2021 can be viewed at: http://www.gov.scot/Resource/0045/00459866.pdf

In this statement, Ministers confirm that there should be full cost recovery of water services (Principle 3) and that charges should be cost-reflective between customer groups (Principle 5). Cost recovery in the non-household sector has been implemented through:

- The metering of all non-household customers (including industry and agriculture operators) where practicable. This ensures an adequate contribution to water services is provided by industry and agriculture user and to improve implementation of the polluter pays principle.

In April 2008 retail competition was introduced for all non-household water customers which was a world first. The separation of the retail activities from wholesale has sharpened the incentives for water retailers to find solutions for their customers that minimise water use and the discharges to sewers.

The Water Industry Commission's detailed implementation of these principles can be viewed in its Final Determination of Charges for 2015 – 2021 at: www.watercommission.co.uk/UserFiles/Documents/Final%20Determination%20-%20Final.pdf

In Scotland, the household sector pays for the costs of the water services provided to it. The average price paid by domestic billed property is £346/year in 2015 – 2016. In setting water charges for households, Scottish Ministers balance a number of public policy considerations. It is our established practice to take account of ability to pay, as permitted by the social and economic provisions of the Directive, by charging households on a flat rate basis linked to local taxation. As Scotland is generally a water rich country it is believed that the lack of direct fiscal incentives on individual households to conserve water will not compromise the achievement of the objectives of the Directive.

Furthermore, national publicity campaigns to encourage households to conserve water are carried out regularly through press and TV advertising, and the Climate Change (Scotland) Act places a duty on Scottish Water to promote water efficiency. Metering trials are underway to gain the better understanding of water usage in the home so that water efficiency measures can be better targeted.

These matters will be kept under review, as part of the regular round of reviews of water charging policy. This approach will be revised if required in light of experience.

## Promoting efficient water use across the environment

As part of an integrated approach to water management, a number of steps have been taken to encourage efficient water use across the whole water environment.

Firstly, the new control regime, introduced in 2005, requires the prior authorisation of any activity likely to have an impact on the water environment. The regime requires operators to take any action necessary for the delivery of our environmental objectives, in line with the impact of their activity on the environment, which reflects the polluter pays principle. This regime is the key tool for delivering the programme of measures.

The regime is risk-based and encourages operators to minimise any impact on the water environment. One key requirement of authorisation is the duty for the authorised person to take all reasonable steps to secure efficient and sustainable water use.

SEPA, before authorising any controlled activity, must assess what steps may be taken to ensure efficient and sustainable water use, and may impose conditions to ensure such use. For example, SEPA has required the metering of volumes abstracted from the water environment where considered appropriate.

As SEPA's evidence of the ecological impact of abstractions of individual water bodies increases (a result of its monitoring programme) it will continue to take further steps to encourage efficient water use in those water bodies. This will be particularly important if areas prone to drought are identified, either in the short-term or in the longer-term as the result of climate change.

SEPA has put in place a charging scheme to recover the costs of Scotland's implementation of the Directive, directly linked to the regime described above. This charging scheme reflects polluter pays principles; and applies to all those activities requiring authorisation, except those considered to pose a very low level of risk.

Key principles of the charging scheme are as follows:

- It aims to allocate costs fairly across all water users, including industry, water service providers, and agriculture.
- It focuses upon activities that are likely to have the greatest impact on the water environment.
- It provides an exemption from charging for those delivering an environmental service.

SEPA has proposed a new charging scheme that will come into effect in April 2016. Designed to build upon the strengths of the previous scheme, it will provide the following more powerful financial incentives to drive good environmental practice by operators.

- The annual charges for operators will be determined by the size of the environmental footprint of the activity.

- Discharges to the environment: the charge is determined by the pollutants discharged over the previous three years. This means that discharges with high levels of pollutants will face higher charges. If operators reduce the level of pollutants discharged then their charges will fall.

- Abstractions: the charge is determined by licenced volume abstracted modified by factors which take account of whether the abstracted water is returned, and if it is, the distance downstream that it is returned. This provides an incentive for operators to reduce the licenced volume abstracted and free up water resources that otherwise would be held by the operator.

- Impoundments: the charges are based on the volume impounded.

- Engineering activities: the charges are based on the type of activity proposed. Higher risk activities face higher charges.

The proposed scheme will also introduce strong financial penalties that will apply if an operator does not comply with the conditions of their authorisation. SEPA proposes to progressively increase the strength of these penalties.

The risk-based control regime, together with the risk-based charging scheme described above, make a significant contribution to the delivery of the stated environmental objectives. Together they provide adequate incentives to ensure efficient water use, and to minimise resource and environmental costs. Both the control regime and the charging scheme are kept under review and revised if required in the light of experience.

## Conclusion

Water pricing policies can act as an additional incentive for water users to use water efficiently. A number of policies have been incorporated into the integrated water management programme, with a view to ensuring that the environmental objectives can be met in a proportionate and cost-effective manner, while having regard to the polluter pays principle. The effectiveness of these measures, as with all others described in this plan, will be kept under review.

# Appendix 10: Consultation and engagement

## Introduction

This appendix provides a summary of the consultation undertaken and engagement opportunities provided through the river basin planning process. It explains how stakeholders have contributed to the development of the river basin management plan for the Scotland river basin district including:

- consultation opportunities;
- active involvement in the river basin planning process;
- public access to information.

## Consultation Opportunities

Consultations undertaken in the Scotland river basin district across the first cycle 2009-2015 and the key outputs are presented in Table A10.1.

**Table A10.1: Consultations for the Scotland river basin district**

| Title | Brief description of document | Key outputs of consultation and how it informed the planning process / draft RBMP | Period of consultation | Lead organisation |
|---|---|---|---|---|
| Working together to protect and improve Scotland's water environment: Getting involved in developing the second river basin plan | Sets out proposals on the timetable and work programme to produce the second RBMP and explained how people can get involved in river basin planning. | The consultation and associated digest of responses can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/publications/ | 28 August 2012 – 28 February 2013 | SEPA |

| Title | Brief description of document | Key outputs of consultation and how it informed the planning process / draft RBMP | Period of consultation | Lead organisation |
|---|---|---|---|---|
| Improving the physical condition of Scotland's water environment | A supplementary plan was produced to identify the work and propose approaches needed to deliver Scotland's river basin management planning objectives for the physical condition of the water environment, as well as a wide range of environmental, social and economic benefits. | The consultation and associated digest of responses can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/publications/ | 27 November 2012 – 14 March 2013 | SEPA |
| Current condition and challenges for the future: Scotland river basin district | An update on the risk assessment on the attainment of objectives set out in the first river basin plan and provides evidence base for updating and reviewing objectives and the programme of measures in the second plans. | The consultation and associated digest of responses can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/publications/ | 22 December 2013 – 22 June 2014 | SEPA |
| A public consultation to inform the development of the second river basin management plan for the Scotland river basin district | The consultation set out the proposed environmental objectives for the next two cycles and sets out the strategies to achieve them. | The consultation and associated digest of responses can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/publications/ | 22 December 2014 – 22 May 2015 | SEPA |
| Delivering Scotland's River Basin Management Plans: Improving the physical condition of Scotland's water environment | This consultation proposed several key steps to strengthen the delivery framework for improving the physical condition of Scotland's water environment. | The consultation and associated digest of responses can be found at: www.gov.scot/Publications/2015/08/2127/1 | 27 February 2015 – 22 May 2015 | Scottish Government |

## Active involvement in the planning process

To be successful, river basin management planning requires co-ordination and integration. This is only achievable through partnership working, and the challenge of meeting the targets set in the river basin plans is a shared goal for Scottish Government, SEPA, responsible authorities, voluntary groups and sector representatives. Opportunities for active involvement in the river basin planning process throughout the first cycle 2009 to 2015, in the Scotland river basin district are presented in Table A10.2.

**Table A10.2: Opportunities for active involvement in the planning process in the Scotland river basin district**

| Sectors, groups and networks | Activity | Lead organisation(s) |
|---|---|---|
| River basin management planning advisory group network | The advisory group network, established several years before publication of the first RBMP, has continued to play an important role in the delivery of river basin planning across Scotland during the first cycle and development of the second river basin plan. During implementation these groups, some sector or geographically focussed, have evolved and adapted the way they work to best suit the needs and demands of the planning process at that time and will continue to play a key role during the second and third cycles.<br><br>Further information on the advisory groups, including their membership, role, remits and minutes, can be found below:<br><br>**National Advisory Group**<br>The National Advisory group (NAG) consists of representatives from responsible authorities, national stakeholders and organisations working at a strategic level. Further information can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp<br><br>**Diffuse Pollution Management Advisory Group**<br>The Diffuse Pollution Management Advisory Group (DPMAG) consists of stakeholders with rural diffuse pollution interests. Further information can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp/dpmag/<br><br>**Fish and Fisheries Advisory Group**<br>The Fish and Fisheries Advisory Group (FFAG) consists of responsible authorities, national stakeholders and organisations working on fisheries at a strategic level. Further information can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp/ffag/ | SEPA |

**Table A10.2: Opportunities for active Involvement in the planning process in the Scotland river basin district continued**

| Sectors, groups and networks | Activity | Lead organisation(s) |
|---|---|---|
| River basin management planning advisory group network | **Area advisory groups**<br>Eleven multi-stakeholder area advisory groups (AAGs), consisting of over 200 members, continue to be in place to contribute to the development and delivery of plans within their areas. The main role of the area advisory groups is to assist with and contribute to river basin management planning in a particular area. More information can be found at: www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp/area-advisory-groups/<br><br>The use of these active networks means that views of a wide range of relevant interest groups are taken into account in the RBMP process; and these members can provide feedback others within their sector. | SEPA |
| Sector specific activities | In addition to these networks specific active involvement has been encouraged in a wide variety of important different sectors. This has included workshops for the forestry and wastewater sectors, individual site discussions for regulated industry, and integration with flooding, strategic and local developments plans through consultation responses and dialogue.<br><br>Invasive non-native species supplementary plan was developed for organisations with a strategic role in the management of INNS. The main purpose of the plan was to identify any gaps in delivery, resources and co-ordination which increase the risk of failing to achieve Water Framework Directive (WFD) objectives and identify a plan of action to address those gaps. These lead organisations have now formed the INNS Statutory Group for Scotland. | Marine Scotland; Scottish Natural Heritage; SEPA; Scottish Government; RAFTS |

## Public access to information

The Scottish Government website provides the policy and regulatory framework to ensure Water Framework Directive principles are embedded in all relevant work.
www.gov.scot/Topics/Environment/Water/15561

Access to more information and contact details has been provided on the regularly updated SEPA's River basin planning web page (http://www.sepa.org.uk/environment/water/river-basin-management-planning ). Information on the website includes:

- description of the river basin planning process;
- information on advisory groups with background documentation such as details of meetings;
- all consultation documents and supplementary plans or links provided;
- online consultation tool that has been used to facilitate responses;
- publication of all consultation digests or links provided.

Scotland's Environment Web www.environment.scotland.gov.uk/ provides a centralised point of access to data from multiple sources, and transforms that data into a format that is accessible and useable to a wider audience. Classification results down to parameters level are provided online in spreadsheet form and an interactive map displays overall classification.

In addition, Farming and Water Scotland web resource www.farmingandwaterscotland.org/ was established by DPMAG, the Scottish Government, Scotland Rural University College, National Farmers Union Scotland and SEPA and launched in 2014. This website is the guide to reducing pollution risks from the farm, helping farmers identify and reduce diffuse pollution risks and keep on the right side of the regulations.

Although advertisements of public consultations were promoted using the advisory group network we have also posted several public notices:

- *Working together to protect and improve Scotland's water environment: Getting involved in developing the second river basin plan* - Edinburgh Gazette;
- *Current condition and challenges for the future: Scotland basin district* - Edinburgh Gazette;
- *A public consultation to inform the development of the second river basin management plan for the Scotland river basin district* -Edinburgh Gazette and The Herald for Scotland.

# Appendix 11: Water Framework Directive requirements

## Water Framework Directive Requirements for content of RBMP

**Table A11.1: Water Framework Directive 2000/60/EC**

| Reference | Description of Requirement | Location in RBMP |
|---|---|---|
| Annex VII, A 1 | A general description of the characteristics of the river basin district required under Article 5 and Annex II | Appendix 2: Review of characterisation and classification systems |
| Annex VII, A 1.1 | Mapping of the location and boundaries of surface water bodies | **Water environment hub** |
| Annex VII, A 1.1 | Mapping of the ecoregions and surface water body types within the river basin | **Water environment hub** |
| Annex VII, A 1.1 | Identification of reference conditions for the surface water body types Background to classification scheme Biological reference conditions Chemical, physiochemical and hydromorphological reference conditions. | Appendix 2: Review of characterisation and classification systems |
| Annex II, 1.3 (vi) | Reasons for exclusion of quality element(s) from the assessment of ecological status for a surface water body type (due to lack of reliable type-specific reference conditions). | Appendix 2: Review of characterisation and classification systems |
| Annex VII, A 1.2 | Mapping of the location and boundaries of groundwater bodies | **Water environment hub** |
| Annex VII, A 6 | Summary of economic analysis | Appendix 2: Review of characterisation and classification systems |
| Annex VII, A 2 | A summary of significant pressures and impact of human activity on the status of surface water and groundwater, including estimation of:<br>• point source pollution;<br>• diffuse source pollution, including a summary of land use;<br>• pressures on the quantitative status of water including abstractions,<br>• analysis of other impacts of human activity on the status of water. | Overall summary of pressures Scotland RBMP main plan document<br><br>Water body-specific information: **Water environment hub** |

**Table A11.1: Water Framework Directive 2000/60/EC continued**

| Reference | Description of Requirement | Location in RBMP |
|---|---|---|
| Annex VII, A 3 | Identification and mapping of protected areas | Identification: Appendix 4: Protected Areas<br><br>Mapping: **Water environment hub** |
| Annex V, 1.3<br>Annex V, 2.2.1<br>and<br>Annex VII, A 4 | A map of the monitoring networks established for the purposes of Article 8 and Annex V | Map of monitoring networks:<br>**Water environment hub** |
| Annex VII, A 4.1 | A presentation in map form of the results of the monitoring programmes for the status of surface water (ecological and chemical). | **Water environment hub** |
| Annex V, 1.3 | Estimates of the level of confidence and precision of the results provided by the monitoring programmes for surface water. | **Water environment hub** |
| Annex V, 1.4.2 | Indication, by a black dot on the map, of failure to achieve good status or potential in the water body due to non-compliance with standard(s) for specific pollutant(s) in surface water. | **Water environment hub** |
| Annex VII, A 4.2 | A presentation in map form of the results of the monitoring programmes for the status of groundwater (chemical and quantitative). | **Water environment hub** |
| Annex V, 2.4.1 | Estimates of the level of confidence and precision of the results provided by monitoring programmes for groundwater. | **Water environment hub** |
| Annex V, 2.4.5 | Indication, by a black dot on the map, of groundwater bodies subject to a significant and sustained upward trend in pollutant concentration due to human activity. | **Water environment hub** |
| Annex V, 2.4.5 | Indication, by a blue dot on the map, of groundwater bodies subject to a significant and sustained reversal in pollutant concentration due to human activity. | **Water environment hub** |
| Annex VII, A 4.3 | A presentation in map form of the results of the monitoring programmes for the status of protected areas. | **Water environment hub** |

**Table A11.1: Water Framework Directive 2000/60/EC continued**

| Reference | Description of Requirement | Location in RBMP |
|---|---|---|
| Annex VII, A 5 | A list of the environmental objectives established under Article 4 for surface waters, groundwaters and protected areas. | Objectives for each water body: **Water environment hub**<br><br>Summary information on objectives for all surface waters and groundwater:<br>Scotland RBMP main plan document<br><br>Further information on objectives for artificial and heavily modified water bodies:<br>Appendix 3: Heavily modified and artificial water bodies |
| Article 4(4) and Annex VII, A 5 | Identification of instances where use has been made of Article 4(4) (extension of deadline for achievement of objectives beyond 2015), and the associated information required under that Article. | **Water environment hub** |
| Article 4(5) and Annex VII, A 5 | Identification of instances where use has been made of Article 4(5) (less stringent environmental objectives), and the associated information required under that Article. | **Water environment hub** |
| Article 4(6) and Annex VII, A 5 | Identification of instances where use has been made of Article 4(6) (temporary deterioration in status), and the associated information required under that Article. | **Water environment hub** |
| Article 4(7) and Annex VII, A 5 | Identification and review of instances where use has been made of Article 4(7) failure to achieve good status or to prevent deterioration in status. | **Water environment hub** |
| Annex VII, A 7 | A summary of the programme of measures adopted under Article 11, including how Article 4 objectives are thereby to be achieved. | Scotland RBMP main plan document<br><br>Appendix 8: Programme of measures |
| Annex VII, A 7.1 | A summary of the measures required to implement Community legislation for protection of water. | Appendix 8: Programme of measures |
| Article 9 and Annex VII, A 7.2 | A report on the practical steps and measures taken to apply the principle of recovery of costs of water use and to incentivise efficient water use in accordance with Article 9. | Appendix 9: Cost recovery |

**Table A11.1: Water Framework Directive 2000/60/EC continued**

| Reference | Description of Requirement | Location in RBMP |
|---|---|---|
| Annex VII, A 7.3 | A summary of the measures taken to meet the requirements of Article 7 (protection of waters used for the abstraction of drinking water). | Appendix 4: Protected areas |
| Annex VII, A 7.4 | A summary of the controls on abstraction and impoundment of water including reference to the registers and identification of the cases where exemptions have been made under Article 11(3)(e). | Appendix 8: Programme of measures |
| Annex VII, A 7.5 | A summary of the controls adopted for point source discharges and other activities with an impact on the status of water in accordance with Article 11(3)(g) and 11(3)(i). | Appendix 8: Programme of measures |
| Annex VII, A 7.6 | Identification of the cases where direct discharges to groundwater have been authorised in accordance with Article 11(3)(j). | None authorised |
| Annex VII, A 7.7 | A summary of the measures taken in accordance with Article 16 on priority substances. | Appendix 8: Programme of measures |
| Annex VII, A 7.8 | A summary of the measures taken to prevent or reduce the impact of accidental pollution incidents. | Appendix 8: Programme of measures |
| Annex VII, A 7.9 | A summary of the measures taken under Article 11(5) for bodies of water unlikely to achieve objectives. | Appendix 8: Programme of measures |
| Annex VII, A 7.10 | Details of the supplementary measures identified as necessary to meet objectives. | Appendix 8: Programme of measures |
| Annex VII, A 7.11 | Details of the measures taken to avoid increase in pollution of marine waters in accordance with Article 11(6). | Appendix 8: Programme of measures |
| Annex VII, A 8 | A register of any more detailed programmes and management plans for the river basin district dealing with particular sub-basins, sectors, issues or water types, together with a summary of their contents. | Appendix 8: Programme of measures<br>Appendix 10: Consultation and Engagement |
| WEWSA Sch.1, Part 1, para. 8 | A non-technical summary of the information provided under paragraphs 1 – 7 of WEWSA, Sch. 1. | River basin management plan 2015-2027: A summary for Scotland |

**Table A11.1: Water Framework Directive 2000/60/EC continued**

| Reference | Description of Requirement | Location in RBMP |
|---|---|---|
| Annex VII, A 9 | A summary of the public information and consultation measures taken, their results, and the changes to the plan made as a consequence. | Appendix 10: Consultation and engagement |
| Annex VII, A 10 | A list of competent authorities in accordance with Annex I. | Appendix 1 Competent authorities |
| Annex VII, A 11 | The contact points and procedures for obtaining details of the background documentation and information referred to in Article 14(1). | Appendix 1 Competent authorities |
| Annex VII, A 11 | The contact points and procedures for obtaining details of the control measures adopted in accordance with Article 11(3)(g) (for point source discharges liable to cause pollution) and 11(3)(i) (for any other significant adverse impacts on the status of water, in particular morphological alterations). | Appendix 1: Competent authorities |
| Annex V11 A 11 | The contact points and procedures for obtaining details of the actual monitoring data gathered in accordance with Article 8 and Annex V. | Appendix 1: Competent authorities |
| Annex VII B 1 | A summary of any changes or updates since the publication of the previous version of the river basin management plan, including a summary of the reviews to be carried out under Article 4(4), (5), (6) and (7). | Appendix 6: Progress towards achieving objectives for 2015 |
| Annex VII B 2 | An assessment of the progress made towards the achievement of the environmental objectives, including presentation of the monitoring results for the period of the previous plan in map form and an explanation for any environmental objectives which have not been reached. | Appendix 6: Progress towards achieving objectives for 2015<br><br>**Water environment hub** |
| Annex VII B 3 | A summary of, and an explanation for, any measures foreseen in the earlier version of the river basin management plan which have not been undertaken. | Appendix 6: Progress towards achieving objectives for 2015 |
| Annex VII B 4 | A summary of any additional interim measures adopted under Article 11(5) since the publication of the previous version of the river basin management plan. | Appendix 6: Progress towards achieving objectives for 2015 |

**Table A11.2: Groundwater Daughter Directive 2006/11/EC**

| Reference | Description of Requirement | Location in RBMP |
|---|---|---|
| Article 3(5)<br><br>Annex II Part A | Publication of threshold values for assessing groundwater chemical status. | Appendix 2: Review of characterisation and classification systems |
| Annex II Part C | A summary of the way in which guidelines set out in Annex II Part A were followed. | Appendix 2: Review of characterisation and classification systems |
| Annex II Part C | Information on number of bodies/groups of bodies of groundwater characterised as at risk and on the pollutants/indicators of pollution which contribute to this classification, including observed concentrations/values. | **Water environment hub** |
| Annex II Part C | Information on each body characterised as at risk. | **Water environment hub** |
| Annex II Part C | Whether threshold values apply at national, river basin district, or body level. | **Water environment hub** |
| Annex II Part C | Relationship between threshold values and (i) for naturally-occurring substances, observed background levels; (ii)environmental quality objectives and other standards for water protection at nation/community/international level; and (iii) any relevant info re toxicology, eco-tox, persistence, bioaccumulation, and dispersion tendency of pollutants. | Appendix 2: Review of characterisation and classification systems |
| Article 3 (6) | Changes to list of threshold values | Appendix 2: Review of characterisation and classification systems |
| Article 4 (4) | A summary of the assessment of groundwater chemical status, including an explanation as to the manner in which exceedances of quality standards or threshold values at individual monitoring points have been taken into account in the final assessment. | **Water environment hub**<br><br>Appendix 2: Review of characterisation and classification systems |

**Table A11.2: Groundwater Daughter Directive 2006/11/EC continued**

| Reference | Description of Requirement | Location in RBMP |
|---|---|---|
| Article 5 (4) | A summary of:<br><br>(1) the way that trend assessment from individual monitoring points within a body/group of bodies of groundwater has contributed to identifying that those bodies are subject to a significant and sustained upward trend in concentration of any pollutant, or a reversal of that trend;<br><br>(2) the reasons for the starting points defined for trend reversal under Article 5(3). | Appendix 2: Review of characterisation and classification systems |
| Article 5 (5) | Summary of the results of trend assessments carried out for identified pollutants to assess impact of existing plumes that may threaten achievement of WFD objectives, in particular plumes from point sources and contaminated land. | **Water environment hub** |

**Table A11.3: Environmental Quality Standards (EQS) Directive 2008/105/EC**

| Location in Directive | Description of Requirement | Location in RBMP |
|---|---|---|
| Recital 17 | Exemptions to application of the EQS for priority substances applied in accordance with Art 4(4), (5) and (6) of WFD should be reported. | None |
| Article 4 (2) | If mixing zones are designated, a description of:<br>(a) approaches and methodologies applied in order to define zones;<br>(b) measures taken to reduce extent of mixing zone in future, such as those under 11(3)(k) WFD or by reviewing permits (Directive 2008/1/EC) or prior regulations referred to in Art 11(3)(g) WFD must be reported. | None designated |
| Article 5 (4) | An updated inventory of emissions/discharges and losses must be reported. | Appendix 7: Inventory of Emissions |
| Article 6 (2) | A summary of the measures taken in instances of transboundary pollution. | No instances identified |