

Annex REPORT ON THE IMPLEMENTATION OF THE WATER FRAMEWORK DIRECTIVE

ASSESSMENT OF ICELAND'S RIVER BASIN MANAGEMENT PLAN

April 2025



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Executive summary

Iceland adopted its first RBMP in 2022, nearly four years after the legal deadline under the EEA Agreement. The RBMP, valid for the period 2022-2027, covers the entirety of Iceland's territory. Iceland is one river basin district, which is further divided into four water regions.

There are 2,406 surface water bodies which comprise 1,871 rivers, 382 lakes, 77 transitional water bodies and 76 coastal water bodies. Surface water body types have been determined for rivers, lakes and coastal waters but types have not yet been determined for transitional waters.

Iceland has not identified any highly modified water bodies or artificial water bodies. 55 water bodies are under consideration for such designation, exclusively due to hydropower.

Iceland has delineated 313 groundwater bodies, all of which are cold groundwater. Hot groundwater has not yet been addressed.

Iceland has not yet undertaken the necessary monitoring and assessment of its water bodies. As such, the chemical, ecological and quantitative status is unfortunately largely unknown. This is considered the most important gap in Iceland's implementation of the Water Framework Directive.

Iceland does have some knowledge of the pressures affecting its water bodies. The main significant pressures on surface water bodies in Iceland are point and diffuse source pollution, causing an excess of nutrients. Other significant pressures are hydromorphological changes, and water abstraction. The main significant pressure on groundwater is diffuse pollution with chemical and nutrient pollution impacts.

Hydropower is the largest source of electricity in Iceland, and some environmental impact should therefore be expected from this sector. Despite this, the RBMP fails to address hydromorphological pressures with appropriate measures.

Whilst the fact this is the first RBMP for Iceland has been borne in mind in the assessment, it is clear that Iceland needs to take some significant steps to improve the situation for its next RBMP. In this respect, it can be noted that at the time of preparation of this report, Iceland has already begun taking some of those steps.



Acronyms and abbreviations used in the assessment

Acronym / Abbreviation	Expanded term
AWB	Artificial Water Body
CIS	Common Implementation Strategy for the Water Framework Directive
EEA	European Economic Area
ETFA	European Free Trade Association
EQS	Environmental Quality Standard
EQSD	Environmental Quality Standards Directive
ESA	EFTA Surveillance Authority
GWB	Groundwater body
НМШВ	Heavily Modified Water Body
КТМ	Key Types of Measures
РоМ	Programme of Measures
RBD	River Basin District
RBMP	River Basin Management Plan
RBSP	River Basin Specific Pollutant
SWB	Surface Water Body
WFD	Water Framework Directive
WISE	Water Information System for Europe



Basis for the assessment and general information

Iceland covers a total area of 103,000 km² and has 400,000 inhabitants¹

Iceland has one River Basin District (RBD) which is divided into four water regions.

Iceland has 2,406 surface water bodies and 313 groundwater bodies.

The basis for the assessment presented in this report is Iceland's 1st river basin management plan (RBMP) covering the years 2022 -2027.

Iceland adopted the RBMP on 4 April 2022 and uploaded it with background documents to the Eionet Central Data Repository (CDR)² in March 2022. Iceland did not report any data electronically in WISE (Water Information System for Europe)³.

ESA has been assisted in the preparation of this report by WSP E&IS GmbH. Iceland was invited to provide comments on an earlier draft, which have been taken into account where appropriate.

It should be noted that structure and name of certain Icelandic agencies changed on 1 January 2025, but the older terms are used here for consistency with the RBMP:

- The Environment Agency and the Energy Authority are now the Environment and Energy Agency.
- The Icelandic Institute of Natural History with inclusion of smaller regional research institutes is now the Institute of Natural History.
- Part of the Environment Agency and Vatnajökull National Park are now the Nature Conservation Agency of Iceland.

¹ Eurostat Data Browser, available at:

https://ec.europa.eu/eurostat/databrowser/view/tps00001/default/table?lang=en.

² Available at: <u>https://cdr.eionet.europa.eu/is/eu/wfd2022/</u>.

³ <u>WISE</u> is an electronic reporting system developed by the European Commission, the European Environment Agency and the EU Member States. Its use is voluntary.



Recommendations following assessment

The following have been identified as recommendations based on the assessment of Iceland's RBMP:

Topic 2 - Characterisation of the River Basin District

- Reference conditions should be established for hydromorphological quality elements and fish.
- Transitional water types should be determined and reference conditions established.
- Emissions inventories for priority substances should be established.

Topic 3 - Monitoring, assessment and classification of ecological status / potential in surface water bodies

- Ecological status of SWBs should be determined with an adequate level of confidence.
- Hydromorphological monitoring should be developed.
- Monitoring for transitional water bodies should be developed.

Topic 4 - Monitoring, assessment, and classification of chemical status in surface water bodies

- Chemical status of SWBs should be determined.
- Chemical monitoring should be included in the monitoring plan, relying on monitoring required through pollution permits where relevant.
- Clarity should be provided on the **frequency of chemical monitoring** and **which substances** are included.
- Information should be provided on the approach to **classification of chemical status**.
- Monitoring in sediment and biota should be included as part of the monitoring plan.
- Information on trend monitoring should be provided.

Topics 5 and 6 - Monitoring, assessment, and classification of quantitative and chemical status of groundwater bodies

- Iceland needs to continue working towards establishing a WFD compliant **classification** of the quantitative and chemical status of GWBs, allowing for determinations with an adequate level of confidence.
- The groundwater quantitative and chemical status assessment methodology should be improved
- Quantitative monitoring of GWBs should be established.
- Operational monitoring of GWBs should be established.

Topic 7 - Designation of heavily modified and artificial water bodies and definition of good ecological potential

- The approach for the **designation of HMWBs and AWBs** should be further developed and include:
 - the criteria for significant adverse effects and whether beneficial objectives can be achieved without affecting the modification;
 - o the classification system for AWBs and HMWBs; and
 - o definition of the difference between good ecological status and potential.



Topics 9, 10, 11, 12, and 13 – Programme of Measures (overview) and measures for abstractions and water scarcity, measures for pollution from agriculture and other sectors, and measures for hydromorphology.

- Iceland should report the **assignment of their national measures to KTMs** distinguishing between basic (Article 11(3)) and supplementary measures (Article 11(4)) and to significant pressures.
- Iceland should report on the **gaps that need to be filled** to achieve WFD environmental objectives.
- Iceland should provide details on the costs of planned measures included in the PoM.
- Iceland should clearly describe the approach to **cost-effectiveness analysis** and **prioritisation of measures**.
- The analysis of **water abstraction** in the RBMP should be based on recently updated data for all relevant uses. This may require improvements in the national statistical system.
- **Hydromorphological** pressures on SWBs should be assessed and addressed by appropriate measures. This includes:
 - the definition and implementation of ecological flows.
 - a clear requirement of **periodic review of abstraction and impoundment permits** as well as other permits related to hydromorphological changes and describing how this review is implemented in the following RBMP. The reviews should ensure that the hydromorphological conditions of the bodies of water are consistent with the achievement of the required ecological potential / status.
- Iceland should provide quantification of the gaps for **nutrient load reductions** and preventing **pesticides or veterinary pharmaceuticals**.
- Once the chemical status of SWBs is known, Iceland should provide a **link** between the **chemical status** of water bodies and the **planned measures**.

Topic 14 – Economic analysis

- Iceland should update the economic analysis of water use from 2011.
- Iceland should update and report **financial cost recovery rate** for water supply and sewerage services (last available covering 2005-2009).
- Iceland should develop and report on the analysis of environmental and resource costs.
- Iceland should provide further and more explicit analysis on **incentive properties** of the current water pricing system and implementation of polluter pays principle and take steps to improve incentive properties of water pricing, in particular, in relation to cold water supply to households and small businesses which is currently not metered.

Topic 15 - Considerations specific to protected areas (identification, monitoring, objectives and measures)

• Information should be provided on the **additional objectives and measures** being set for the protection of water bodies associated with protected area.

Topic 16 - Adaptation to drought and climate change

• Iceland should demonstrate how **climate change** projections have informed assessments of WFD pressures and impacts; how monitoring programmes are configured to detect climate change impacts; and how selected measures are robust enough to cope with projected climate conditions.

1 Governance and public participation

Robust, appropriate and effective multi-level governance structures are essential pre-requisites for successful integrated river basin management⁴. Key aspects of water governance include ensuring "an adequate territorial approach, the clear identification of responsibilities, coordination and cooperation across sectors, interests and borders as well as ensuring adequate human and financial resources are allocated"⁵.

Under the Water Framework Directive (WFD), the EEA EFTA States are to ensure consultation and access to background information used for the development of RBMPs and also to encourage active involvement of all interested parties. By involving the public and stakeholders, participation can strengthen their commitment and engagement, including in the implementation of measures.

1.1 Assessment of implementation and compliance with WFD requirements

1.1.1 Administrative arrangements – River Basin Districts (RBDs)

Iceland is considered as one RBD. The RBD is divided into four water regions and one RBMP has been prepared. The RBMP was adopted on 4 April 2022.

The RBMP does not address the late adoption of the RBMP as an issue. It does, however, note that the WFD was made part of Icelandic law in 2011⁶ and states that implementation began in 2011-2014 and, following a break for several years, restarted fully in 2017.

1.1.2 Administrative arrangements – competent authorities

The RBMP lists 9 competent authorities (in line with the Icelandic Water Management Act):

The Minister of Environment and Natural Resources	Supervises the management of water resources and approves the three plans that shall be carried out for water management.		
The Water Council	An advisory body to the Minister of Environment and Resources on water management.		
The Environment Agency of Iceland	Handles administration in the field of water protection in accordance with the instructions of the Water Management Act and makes recommendations to the Minister for the drafting of regulations under the act.		
The Advisory Committee of Governmental Organisations and Regulators	Advises the Environmental Agency of Iceland and the Water Council on matters covered by the Water Management Act.		
The Advisory Committee of Stakeholders	Advises on the issues to which their organisations are dedicated.		
Water Region Committees (includes the municipalities and	ssist the Environment Agency of Iceland during the preparation of roposals for the RBMP, Programme of Measures (PoM) and monitoring lan and their review.		

⁴ Commission Staff Working Document, European Overview – River Basin Management Plans, page 33, available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=SWD:2019:30:FIN&qid=1551267381862&from=EN. ⁵ Ibid.

⁶ Icelandic Act No. 36/2011 on water management.



Public Health Authorities)	Coordinate work in the relevant water region and gather information for the preparation of the status report, RBMP, PoM and monitoring plan.
Research institutes	The Icelandic Meteorological Office, the Marine and Freshwater Research Institute and the Icelandic Institute of Natural History provide data and expertise on the implementation of the Water Management Act

1.1.3 Public Participation

The draft RBMP, along with the draft PoM and monitoring plan⁷, were submitted for a six-month public consultation prior to approval, in accordance with the requirements of the WFD. Wide consultation also took place during the development of the RBMP through involvement of the Water Region Committees and Advisory Committees.

The comments of the stakeholders are presented in a separate document published on the Environment Agency of Iceland's website, along with reactions to them and details of whether they would be reflected in the final RBMP.⁸ Most of the issues raised in the stakeholders' comments were not reflected in the final RBMP since they were not of such a nature that the plan had to be changed. Some small adjustments were made.

1.2 Summary of gaps in implementation

No gaps in implementation have been identified.

2 Characterisation of the River Basin District

Article 5 of the WFD requires EEA EFTA States to undertake an analysis of the characteristics of each RBD or portion of an international RBD falling within their territory. Characterisation includes the delineation of surface water bodies (SWBs) and groundwater bodies (GWBs). Characterisation should identify all relevant categories and types of water bodies within the RBD. For SWBs, characterisation includes the identification of heavily modified water bodies (HMWBs) and artificial water bodies (AWBs).

Water bodies should be delineated at a size that allows the identification and quantification of significant pressures. Characterisation also requires the assessment of the risk that a water body may fail the objectives of the WFD unless appropriate measures are taken.

2.1 Assessment of implementation and compliance with the WFD requirements

2.1.1 Delineation of water bodies and designation of heavily modified and artificial water bodies

Table 2.1 shows the number of GWBs and SWBs per category. Iceland's 2,406 SWBs are delineated in the river, lake, transitional and coastal categories but no territorial water bodies have been delineated. The RBMP refers to a report that details the criteria applied for delineation.⁹ In line with the WFD, for a river water body to be delineated, it must have a catchment area greater than 10 km². The minimum size for a lake water body to be delineated is 0.5 km². Smaller lakes may also be delineated using other factors, for example if they are under pressure, are important for nearby settlements, or are studied and related measurements can be used in further work on type analysis and / or condition classification. The minimum size for a transitional water body is 0.5 km².

⁸ Available at: https://www.ust.is/library/sida/haf-og-

⁷ Water program monitoring plan 2022 – 2027, published by Umhverfisstofnun.

vatn/Umsagnir%20vatna%c3%a1%c3%a6tlunar%20%c3%8dslands%202022-2027.pdf. ⁹ Available at:

https://ust.is/library/Skrar/Einstaklingar/Vatnsgaedi/Vatnatilskipunin/Ve%c3%b0urstofan_1213_01_vatnshlotavinn a-verklagsreglur2013.pdf.



and transitional water bodies are based on clear geographical boundaries such as estuaries or outfalls where possible.

Iceland has not yet designated any HMWBs or AWBs. However, 40 SWBs have been provisionally identified as HMWBs candidates and 15 SWBs provisionally identified as AWBs candidates.¹⁰

There are 313 GWBs as shown in Table 2.1. Iceland has delineated GWBs with a minimum size of 10 km². GWBs smaller than 10 km² have been merged with the adjacent GWB. The RBMP states that if stress caused by pollution or other factors are present, it may be necessary to divide a GWB into more water bodies. Hot GWBs are yet to be delineated.¹¹

Table 2.1 Number of delineated surface water bodies and groundwater bodies in Iceland in the $1^{\mbox{st}}$ RBMP

Rivers	Lakes	Transitional	Coastal	Territorial	Groundwater
1871	382	77	76	0	313

Small water bodies

The WFD protects all waters independently of their size, but for operational purposes it defines a water body as a 'discrete and significant' element of water. The water body is the scale at which status is assessed.

The RBMP states that pressures caused by pollution or other factors can lead to smaller lakes, streams and other surface waters being defined as water bodies. The pond Tjörnin in Reykjavik is an example of a water body that is below the minimum size for the delineation of lakes but which has been delineated as a water body due to pressure.

Smaller rivers and tributaries which do not reach the minimum size as a separate water body and are not delineated based on other factors (e.g. pressure), are defined with and as part of the main river water body, i.e. they form one continuous river water body.

2.1.2 Typology of surface water bodies

In Iceland, System B in Annex V of the WFD is used to define typology of water bodies. The RBMP explains the methodology used to define typology and refers to several documents where the methodology is described in a more detailed manner. The number of surface water types per water category is shown in Table 2.2. Surface water types have been determined for river, lakes and coastal water bodies. The RBMP states that there is currently not enough data available to determine transitional types.

TABLE 2.2 NUMBER OF SURFACE WATER BODY TYPES AT RBD LEVEL IN ICELAND IN THE 1ST RBMP

Rivers	Lakes	Transitional	Coastal
8	7	Not yet determined	4

2.1.3 Establishment of reference conditions for surface water bodies

Annex II of the WFD sets out a requirement to establish type-specific reference conditions for biological, hydromorphological and physico-chemical quality elements. These represent the values of such quality elements at high ecological status.

¹⁰ Iceland has clarified that further updates have been completed since 2022, with a total of 59 water bodies now provisionally identified as candidates for AWBs or HMWBs.

¹¹ Iceland has stated that delineation of all groundwater bodies in Iceland is currently under revision for the next RBMP.



In 2020, reference conditions for river and lake water bodies were determined and approved. The background report on reference conditions for rivers and lakes is referenced in the RBMP.¹² For the river types, reference conditions are established for biological quality elements (macroinvertebrates, aquatic plants, and phytobenthos) and physico-chemical quality elements (conductivity, acidification status, nutrients, and oxygenation conditions). For the lake types, reference conditions are established for biological quality elements (macroinvertebrates, aquatic plants and phytoplankton) and physico-chemical quality elements and phytoplankton) and physico-chemical quality elements (conductivity, acidification status, nutrients, and oxygenation conditions). For the lake types, reference conditions are established for biological quality elements (conductivity, acidification status, nutrients, and oxygenation conditions). Reference conditions for hydromorphological quality elements are not established, due to prioritisation of funding.¹³

Reference conditions for coastal water body types were established in November 2022.¹⁴ The RBMP refers to a background report on reference conditions for coastal water bodies from 2019.¹⁵ In the report, reference conditions are proposed for biological quality elements (phytoplankton, macroinvertebrates, and macroalgae) and physico-chemical quality elements (nutrients).

There is no indication in the RBMP of whether reference conditions are being worked on for transitional water bodies. $^{\rm 16}$

The RBMP states that in the next water cycle, knowledge about the reference conditions for each type will be further strengthened.

2.1.4 Characteristics of groundwater bodies

Links between GWBs and SWBs and terrestrial ecosystems have not been estimated in Iceland.

The RBMP states that the delineation of GWBs considered the rock type and its characteristics, such as permeability, and that the permeability of bedrock / strata is of great importance for how GWBs are delineated. The RBMP states that a further description has been provided of the characteristics of GWBs considered to be under pressure.¹⁷ Iceland provides an online data presentation tool called the Icelandic Water Viewer¹⁸, and here the characteristics of the bedrock within each GWB are presented.

The RBMP states that Iceland's hot groundwater needs to be researched further. Only cold groundwater is addressed in this cycle. More research is needed regarding actions and mapping for the groundwater resource.

2.1.5 Significant pressures and impacts on water bodies

The main significant pressures on SWBs in Iceland are point source pressures, diffuse source pressures and pressures from morphological changes. The main drivers of pressures on SWBs are from urban wastewater treatment plants, urban areas (driving diffuse pollution), aquaculture (both land-based and sea-based), hydropower plants (driving hydromorphological pressures) and agriculture.

One lake water body has been identified as at risk due to pressures from nutrients.¹⁹

The main significant pressures on groundwater are diffuse pollution (with chemical impacts) and abstraction.

¹⁵ Available at: http://vatn.is/library/Skrar/Atvinnulif/Haf-og-

 $^{\rm 17}$ The RBMP references a report on the properties of groundwater bodies under

chemical stress which is available at: http://vatn.is/library/Skrar/Atvinnulif/Haf-og-

vatn/Eiginleikar%20grunnvatnshlota%20undir%20efna%c3%a1lagi.pdf.

¹⁸ Available at: https://vatnavefsja.vedur.is/.

¹² Available at: https://ust.is/library/sida/haf-og-vatn/VI_2020_007_vef.pdf.

¹³ Iceland has stated that reference conditions for hydromorphological quality elements are being prepared for rivers and lakes for the 2nd RBMP.

¹⁴ Available at: <u>https://www.hafogvatn.is/static/research/files/hv2022-39.pdf</u>.

vatn/G%c3%a6%c3%b0a%c3%be%c3%a6ttir%20og%20vi%c3%b0mi%c3%b0%20strandsj%c3%a1varvatnshlota%20 2019.pdf.

¹⁶ Iceland has clarified that data collection of transitional quality elements and the development of the classification system will start in the coming years.

¹⁹ Iceland subsequently noted that (based on current data) nutrients are generally not a pressure in Iceland because the receiving waters are mostly nutrient deficient and water exchange is very high.



2.1.6 Definition and assessment of significant pressures on surface and groundwater

The RBMP provides information on an analysis of pressures and impacts on SWBs and GWBs conducted in 2012-2013 by the Environment Agency of Iceland with the help of stakeholders such as the four Water Region Committees and local Public Health Authorities. A special report from 2013 is referred to in this regard.²⁰ The pressure assessment links the pressures with a water body's inability to meet or risk of not meeting the environmental status objectives.

The analysis in 2012-2013 focused on pressures from industry and wastewater contamination. The findings were then updated in 2019 by adding more information, including data from possible contaminations originating from aquaculture, urban wastewater and industry. The pressure analysis is intended to be re-evaluated for the next cycle.

2.1.7 Groundwater bodies at risk of not meeting good status

The RBMP identifies one GWB to be at risk of not achieving good chemical status. This GWB is Rosmhvalanes 2 which is located in an area close to Keflavík Airport, urban areas, landfills and polluting industries. The contamination in this GWB is multifaceted, but the pressure analysis showed various heavy metals, priority substances and other polluting chemicals from old landfills to be present.

2.1.8 Quantification of the gap and apportionment of pressures

Impacts and pressures should be apportioned to the responsible drivers, sectors and activities to give a clear picture of the most important sources for a given impact so that measures can be effectively and efficiently targeted.

Pressures have been linked to sources and drivers, but the RBMP does not provide a quantitative apportionment on the number of water bodies affected by each pressure and driver.

The RBMP does not provide quantification on the gap to good status.

2.1.9 Inventories of emissions, discharges and losses of chemical substances

The Environmental Quality Standards Directive (EQSD)²¹ requires the establishment of an inventory of emissions, discharges and losses of all priority substances and the eight other pollutants listed in Part A of Annex I of the EQSD for each RBD. This inventory should allow EEA EFTA States to further target measures to tackle pollution from priority substances. It should also inform the review of the monitoring networks, and allow the assessment of progress made in reducing (or suppressing) emissions, discharges and losses for priority substances.

The RBMP does not contain emissions inventories for priority substances.

2.2 Summary of gaps in implementation

- Reference conditions have not been established for hydromorphological quality elements.
- Reference conditions have not been established for fish.
- Surface water types for transitional waters have not yet been established.
- Reference conditions for transitional waters have not been established.
- Emissions inventories for priority substances are not provided in the RBMP.

vatn/Vatnatilskipun/St%c3%b6%c3%b0usk%c3%bdrsla%20fyrir%20vatnasv%c3%a6%c3%b0i%20%c3%8dslands%2 02013.pdf.

²¹ Directive 2008/105/EC.

²⁰ Available at: http://vatn.is/library/Skrar/Atvinnulif/Haf-og-

3 Monitoring, assessment and classification of ecological status / potential in surface water bodies

Ecological status is an expression of the quality of the structure and functioning of aquatic ecosystems associated with surface waters. There are five classes for ecological status; 'high', 'good', 'moderate', 'poor', and 'bad'. The main objective of the WFD is that all surface waters should be at least in good ecological status or potential by 2024 for the EEA EFTA States (unless exemptions are applied).²² Ecological status is determined through the monitoring and assessment of biological, physico-chemical and hydromorphological quality elements.

3.1 Assessment of implementation and compliance with the WFD requirements

3.1.1 Monitoring of ecological status / potential of surface water bodies

Article 8 of the WFD requires the establishment of monitoring programmes to assess the ecological status of surface water and groundwater, in order to provide a coherent and comprehensive overview of water status within each RBD. The WFD distinguishes between surveillance and operational monitoring.²³. Surveillance monitoring is carried out for one year, once per six-year cycle and is mainly aimed at assessing long-term changes in natural conditions or resulting from anthropogenic pressures and is used for the purpose of designing future monitoring programmes. Operational monitoring is carried out throughout the cycle and aims mainly at establishing the status of bodies identified as being at risk of failing to meet their environmental objectives and assessing any changes in status resulting from the Programme of Measures (PoM).

Monitoring programmes

Prior to the RBMP, only two water bodies were monitored for ecological status (Lake Þingvallavatn and Laka Myvatn, both in protected areas).

The RBMP presents Iceland's first monitoring plan to be implemented in the 2022-2027 cycle. The monitoring plan is presented in a background report.²⁴

Selection of monitoring sites

In the monitoring plan it is explained how surveillance monitoring sites will be selected, and which parameters will be monitored. The RBMP says that surveillance monitoring will be carried out on a sufficient number of SWBs to allow an assessment of the overall state of surface water in the RBD. Efforts will be made to assess both natural water bodies and water bodies under pressure. The surveillance monitoring programme contains the required information set out in section 1.3.1 of Annex V to the WFD.

The Icelandic Environment Agency is tasked with steering the monitoring programme and ensuring it follows the methodology outlined by the WFD to guarantee scientific quality and comparable results. The Marine and Freshwater Research Institute, Icelandic Meteorological Office and Icelandic Institute of Natural History were involved in formulating the monitoring programme and will provide consultancy in relation to the monitoring of specific quality elements when appropriate.

The RBMP states that operational monitoring will be carried out in SWBs where surveillance monitoring has confirmed that the water body is at risk of not meeting the good status objective. For SWBs at risk from more than one type of pollution pressure, a sufficient number of monitoring sites will be selected within each water body to enable the overall extent and impact of the discharge to be assessed, whether from point sources, diffuse discharges or hydromorphological pressures. The selection of quality elements will be based on the pressure to which the water body in question is subjected to.

²² See topic 8 of this report.

 $^{^{\}rm 23}$ Annex V, Point 1.3 of the WFD.

²⁴ Available at: https://ust.is/library/sida/haf-og-

vatn/V%c3%b6ktunar%c3%a1%c3%a6tlun_vatna%c3%a1%c3%a6tlunar%202022-2027.pdf.



Grouping

The WFD allows the grouping of water bodies for monitoring and assessment. Only similar types of water bodies can be grouped, for example, where the ecological conditions are similar, or almost similar, in terms of the magnitude and type of pressure or combination of pressures on the water bodies.

In the monitoring plan, it is discussed that grouping will be used in the surveillance monitoring for both SWBs and GWBs. However, monitoring of transitional waters (estuaries) has yet to be planned and will not begin until necessary information has been gathered (e.g. about salinity and tides), the type classification of transitional water bodies has been undertaken, and the pressure analysis has been completed.

The methodology for other water bodies is described in the monitoring plan in the following way:

- Certain water bodies within groups of comparable water bodies have been selected for surveillance monitoring. The state of those water bodies will be transferred to the other water bodies. Comparable water bodies means, for example, that the water bodies are of the same type or have common characteristics, provided that they are under similar and low pressure.
- In the case of significant pressure, where water bodies have been assessed as at risk of not meeting their environmental objectives in the pressure analysis, the results of the monitoring will not be transferred to other comparable water bodies. Instead, each of them will be monitored separately with surveillance monitoring to confirm the risk assessment and then with operational monitoring. The same applies to water bodies that turn out to be in less than good status.

The RBMP includes a table of the number of SWBs that will be covered in the monitoring plan. This is shown below in Table 3.1.

Water category	Total number of water bodies	Number of monitored water bodies	% of water bodies covered in the monitoring
Coastal	76	4	5.2
Lake	382	10	2.6
River	1871	9	0.5
Transitional	77	0	0
Total	2406	23	0.8

TABLE 3.1 WATER BODIES TO BE INCLUDED IN THE MONITORING PROGRAMME

Selection of quality elements monitored

The quality elements planned to be included in the monitoring are shown in Table 3.2. Gaps include missing relevant biological quality elements for rivers (macrophytes, phytobenthos, and fish), lakes (phytobenthos), transitional (phytoplankton, macroalgae, angiosperms, and macroinvertebrates), and coastal (angiosperms). The RBMP states that work is underway on the analysis of diatoms (phytobenthos) (Bacillariophyceae) from selected rivers.²⁵ Notable gaps are a lack of hydromorphological quality elements planned to be monitored and no monitoring of quality elements in transitional waters.

²⁵ Iceland has stated that a classification system for *bacillariophyceae* has been developed and will likely be included in the next RBMP.



Hydromorphological **Biological quality elements** Physico-chemical quality elements quality elements Hydrological or tidal regime Nitrogen conditions Thermal conditions Acidification status Other aquatic flora Salinity conditions Morphological conditions [>]hytoplankton Transparency conditions Phytobenthos Benthic invertebrates Macrophytes Angiosperms Oxygenation conditions Phosphorus Conditions Macroalgae Continuity conditions Fish Yes Yes Yes Yes Yes Yes Rivers Yes Yes *** ** Lakes Yes * ** *** Transitional Coastal Yes Yes Yes Yes Yes Yes

TABLE 3.2 BIOLOGICAL, HYDROMORPHOLOGICAL, AND GENERAL PHYSICO-CHEMICAL QUALITY ELEMENTS WHICH ARE MONITORED FOR EACH WATER CATEGORY

Notes: *The monitoring plan states that water level will be monitored in two lakes. **Conductivity is measured for rivers and lakes. ***Ammonium (NH4) is measured for rivers and lakes.



Monitoring frequencies

Annex V, Point 1.3.4, of the WFD provides guidance on the frequency of monitoring of the different quality elements.

For biological or hydromorphological quality elements, monitoring shall be carried out at least once during the surveillance monitoring period. Monitoring for physico-chemical quality elements should be in line with the frequencies set out in the table of Annex V, Point 1.3.4 unless greater intervals are justified on the basis of technical knowledge and expert judgment.

Operational monitoring should be carried out at intervals that do not exceed the frequencies as set out in the table of Annex V, Point 1.3.4 unless greater intervals are justified on the basis of technical knowledge and expert judgment.

For phytoplankton this should be done twice during the monitoring year and for the other biological quality elements once during that year. For river basin specific pollutants (pollutants that are discharged in significant quantities into the body of water; RBSPs) this should be done four times for the surveillance year, and for operational monitoring four times a year for each year of the cycle. As a guideline, operational monitoring should take place at intervals which do not exceed once every six months for phytoplankton and once every three years during the six-year cycle for the other biological quality elements. Greater intervals may be justified based on technical knowledge and expert judgment.

The monitoring frequencies in the RBMP appear to be in accordance with the WFD.

Surveillance and operational monitoring for river basin specific pollutants (RBSPs)

Annex VIII of the WFD sets out an indicative list of the main pollutants that States should use to identify RBSPs.

RBSPs are not identified in Iceland.

3.1.2 Assessment of ecological status / potential of surface water bodies

Assessment methods for the biological quality elements

The quality elements for rivers, lakes and coastal waters include determining the composition and abundance of macroinvertebrates, phytoplankton and aquatic vegetation, and nutrients (see in more detail below). Ecological status of a water body is estimated by different quality elements depending on the type of water body, since each water type has its own reference condition (high status) and a classification system for ecological status. Changes in the quality elements are compared to the expected state of water under natural conditions (reference conditions). Proposal of reference water bodies have been defined for rivers, lakes and coastal waters. A water body is considered to fail its environmental objective if only one quality element deteriorates to the point of changing its status classification.

Quality elements have been decided for rivers, lakes and coastal waters. Reference values and boundaries between condition categories have been proposed for:

- Rivers: Benthic algae, macroinvertebrates, acidification state (pH and alkalinity), conductivity, nutrients, and oxygenation condition.
- Lakes: Planktonic algae, aquatic plants, macroinvertebrates, acidification state (pH and alkalinity), conductivity, nutrients, and oxygenation condition.
- Coastal waters: Benthic algae, proportion of different algae, description of the coast, and nutrients.

A first draft has been made of a classification system for rivers, lakes and coastal water bodies. However, the draft does not include a classification system for aquatic flora in rivers.²⁶ The first draft of reference values for streams and lakes is presented. It was not possible to set thresholds for

²⁶ Iceland has stated that Icelandic rivers are fast flowing and usually with coarse substrate. As such, macrophytes are not abundant in the rivers (unlike many European rivers). Iceland therefore considers a classification system for macrophytes for rivers is therefore not applicable.



condition categories for all types of streams and lakes as there was insufficient biological or physicochemical data from all types of water bodies. Several components need more work e.g. strengthening knowledge on type-specific reference conditions and finalising the classification methodology to estimate ecological status of water bodies. Quality elements for transitional waters have not been decided, nor have hydromorphological quality elements for SWBs. Furthermore, additional work is needed regarding fish as a biological element in inland water bodies.

In the RBMP it is stated that the classification system for ecological status of water bodies needs to be strengthened. With the implementation of the monitoring plan, information will be collected on pressures and on the baseline condition of water bodies under natural conditions.

Intercalibration of biological quality element methods

To ensure comparable definitions of good ecological status across Europe, EEA EFTA States are obliged to intercalibrate the good ecological status class boundaries of their methods for each biological quality element in each water category with other EEA States having common types of water bodies.²⁷ Intercalibration is a distinct obligation at EEA level in addition to the obligation to develop national ecological status methods²⁸, i.e. the lack of success of intercalibration does not exempt EEA EFTA States from the obligation of developing assessment methods for all biological quality elements.

Iceland has not been part of the intercalibration work until now, but the work of the intercalibration group that has comparable habitats (Northern Europe) was considered in relation to coastal waters, rivers and lakes. The work related to different types of coastal waters in Iceland was partly based on the types of coastal water in Norway, divided into five types. The result showed that of these types, two types can be compared to coastal water bodies around Iceland, or open coastal areas and sheltered coastal areas and fjords. In relation to rivers and lakes, the results showed that in general, the Icelandic water types fit well with intercalibration types, especially siliceous and organic rivers and lakes that are prevalent in Northern Europe, including Iceland. There are, however, examples where no intermediate calibration type applies to lakes with glacial elements or lakes that have an average depth of less than 3 m, as are found in Iceland. It was also assumed that ecological quality ratios that have been defined for quality factors in neighbouring countries of Iceland, which have undergone intercalibration work, can be used to establish boundaries between condition categories in Icelandic rivers and lakes. Very limited data exists in Iceland that can be used.

Assessment methods for hydromorphological quality elements

Hydromorphological quality elements have not been included in the plan for assessment.

Assessment methods for general physico-chemical quality elements

In the RBMP it is stated that the assessment method is to assess changes in the physico-chemical quality elements (conductivity, acidification state, nutrients in winter, oxygen state) depending on the type of water body and compare them to the expected state of water under natural and unpolluted conditions (reference conditions). A first draft has been made of a classification system for river and lake bodies, with the system for coastal water bodies to follow.²⁹ The first draft of reference values for streams and lakes is presented in a background report from 2020.³⁰ It was not possible to set thresholds for condition categories for all types of rivers and lakes as there was insufficient biological or physico-chemical data from all types of water bodies. Several components need more work, e.g. strengthening knowledge on type-specific reference conditions and to finalise the classification methodology to estimate ecological status of water bodies.

Selection of RBSPs and use of environmental quality standards (EQS)

EQSs have not been developed in Iceland. In this RBMP, it has been decided to not use special pollutants in the first ecological classification of SWBs in Iceland, and specific EQSs have not been set

²⁷ Annex V, Section 1.4.1 WFD.

²⁸ Methods for the assessment of the quality elements set out in the WFD to establish ecological status/potential.
²⁹ Since the publication of the RBMP, this the classification document for coastal water bodies has been published and is available at: <u>https://www.hafogvatn.is/static/research/files/hv2022-39.pdf</u>.

³⁰ Available at: <u>https://utgafa.ni.is/skyrslur/2020/NI-20010.pdf</u>. Iceland has noted that this has been updated in 2022.



for them. No pollutants have been defined as other specific pollutants for any water body in Iceland. The RBMP states that definition of specific pollutants in Iceland will wait until it becomes clearer that there is a need for it.

3.1.3 Classification of ecological status / potential of surface water bodies

Ecological status and potential of SWBs

The ecological status of a SWB is determined on the basis of the biological quality elements and with the physico-chemical and hydromorphological quality elements framework supporting the biological quality elements. The ecological status of a SWB is determined by the worst biological quality element. The status class will be downgraded to moderate if the worst biological quality element is good and one of the supporting physico-chemical quality elements is less than good. The physico-chemical quality elements can only downgrade a water body to good or moderate. A poor or bad status classification will be determined by a biological quality element. For a water body to be at high status, all quality elements (biological, physico-chemical, specific pollutants and hydromorphological) must be at high status. This is described as "one-out-all-out".

Ecological monitoring and classification of SWBs has not been carried out in Iceland therefore the status of SWBs in each category is not known.³¹

Reasons for failing to achieve good ecological status / potential of SWBs

Ecological classification of SWBs has not been carried out in Iceland. However, based on the pressure analysis, 16 SWBs are defined to be in unknown status with regards to ecological status.

3.2 Summary of gaps in implementation

- The ecological status of SWBs has not been determined.
- Plans for hydromorphological monitoring and assessment across all water categories are not included in the RBMP.
- Transitional water bodies are not yet included in the plans for monitoring and assessment.

4 Monitoring, assessment, and classification of chemical status in surface water bodies

Good surface water chemical status means the chemical status required to meet the environmental objectives for surface waters established under Article 4(1)(a) of the WFD. This means the chemical status achieved by a SWB in which concentrations of pollutants do not exceed the environmental quality standards (which are the concentration of a particular pollutant or group of pollutants in water, sediment or biota which should not be exceeded to protect human health and the environment). Monitoring is used to determine the concentrations of pollutants and subsequently establish the chemical status of a SWB.

³¹ Iceland has provided an update that it was decided in June 2022 to assign high ecological status (extrapolate) to all water bodies that had not been identified as under anthropogenic pressure in previous pressure analyses (2013 and 2019). This decision was based on the background data that was the basis for the reference conditions in rivers and lakes. The data showed an overwhelming majority of lakes and river water bodies to be in high ecological status. In the Icelandic Water Viewer, a disclaimer was added stating that the assigned "high" status was based on pressure analysis with a low reliability of data, and further analysis / monitoring should be done to verify the status.



4.1 Assessment of implementation and compliance with WFD requirements

4.1.1 Monitoring of chemical status in surface water bodies

Monitoring

Article 8(1) of the WFD requires the EEA EFTA States to establish monitoring programmes for the assessment of the chemical status of surface water. As a caveat, the intention is not that every single water body within a RBD should be subject to monitoring, but that the monitoring network should be sufficiently comprehensive, in order to provide a coherent and thorough overview of the chemical water status within each RBD.

The ultimate aim of the status assessment is to identify which water bodies are at risk from the potential impacts of priority substances, to further inform what kind of measures are needed to mitigate the risk. Precise and reliable monitoring results are therefore a prerequisite for sound planning of investments in the PoMs.

The RBMP and monitoring plan indicate that a pressure assessment has been completed to help determine which water bodies may be at risk, and a monitoring network established based on that pressure assessment.

In the RBMP, it is stated that the Icelandic Environment Agency has been responsible for the methodology and approach adopted for monitoring to meet regulatory requirements. This includes ensuring that the approach meets a high level of scientific quality and monitoring produces comparable results.

The RBMP states that monitoring was undertaken in 12 SWBs in 2019/2020 for priority substances, as part of a wider process to assess chemical risks, which commenced with a desk-based risk assessment.

The monitoring plan highlights that preliminary work began in 2013 with a pressure assessment (which included trial monitoring at Lake Myvatn). This allowed the Environment Agency to trial its approach and determine the monitoring network. Monitoring sites were selected based on this pressure assessment and to maintain continuity with obligations under the OSPAR Convention³² related to the marine environment. Therefore, the monitoring plan is submitted based on a description of the characteristics of surface water in the RBMP and a pressure analysis that has been carried out in Iceland. As a further comment, monitoring will be undertaken on two types of water bodies, i.e. those seen as in a natural state and thus monitored as type-specific reference conditions, and those water bodies considered under pressure, or which have already been categorised as in uncertainty or at risk of not meeting their environmental objectives.

Chemical monitoring is not included in the monitoring plan. Some monitoring is foreseen as part of pollution permits, but a complete overview is lacking, along with essential details such as monitoring frequency and substances covered.

The monitoring plan does not cover priority substances, and states that little is known about which priority substances are relevant for Iceland.

³²The Oslo and Paris Convention (OSPAR) was adopted in 1992, with the aim to protect the marine environment in the North-East Atlantic. It was born out of a series of developments relating to marine pollution incidents. This included the Torrey Canyon oil spill (in 1967) off the coast of the UK and loss of 117,000 tonnes of crude oil. The Oslo Convention (1974) aimed to address marine pollution from dumping at sea by ships and aircraft. The subsequent Paris Convention (1978) aimed to protect marine pollution from land sources. The combined OSPAR Convention expands and solidifies these commitments to protect the marine environment, which includes Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, and The United Kingdom as member countries.



Long-term trend monitoring and monitoring of priority substances in water, sediment and biota for status assessment

Article 3(6) of the Environmental Quality Standards Directive requires EEA EFTA States to monitor priority substances listed in Part A of Annex I, giving particular consideration to 20 substances³³ that tend to accumulate in sediment and / or biota, for the purpose of long-term trend assessment. Monitoring should be carried out at least every three years, unless technical knowledge and expert judgment justify another interval.

Appendix IV of the monitoring plan states that monitoring in biota and sediment is needed for longterm trend analysis. The text indicates that the approach has been determined by the pressure assessment for water bodies at potential risk. The scale of the monitoring network, which substances are included, and the frequency of monitoring is not detailed in either the RBMP or the monitoring plan. It is therefore not possible to comment on these aspects or compliance with the WFD.

Monitoring for long term trend assessment

The monitoring plan states that there is a requirement for long-term trend analysis and that this should be informed by the pressure assessment. Beyond this, the RBMP simply states that long-term trends will be reviewed if an upward trend due to human influence is revealed in the 2022-2027 monitoring programme. It should be noted that this is the first RBMP for Iceland and that analysis of long-term trends requires sufficient temporal data.

Monitoring of priority substances that are discharged in each RBD

EEA EFTA States are required to undertake surveillance monitoring for all priority substances which are discharged into the river basin or sub-basin. States shall monitor as relevant all priority substances discharged, and other pollutants discharged in significant quantities.

The RBMP states that the pressure assessment from 2013, which was partially updated in 2019, has been used as the basis for identification of issues related to surface water. The primary issue relates to sewerage, but further details around whether monitoring of discharges has been completed are not provided.

Additionally, no information on emissions inventories is available in the RBMP. In the pressure analysis on which the monitoring plan is based, emphasis was placed on pollution from various types of industry and available data on the emission of priority substances used.

The RBMP also includes a chapter on pollution detailing the considerations around potential point sources and diffuse emissions, which will help determine where potential risks occur and contribute to the work under the PoMs.

4.1.2 Assessment of chemical status of surface water bodies

EEA EFTA States are required to report the year on which the assessment of chemical status is based.³⁴ This may be the year that the SWB was monitored. If grouping is used, this may be the year in which monitoring took place in the SWBs within a group that are used to extrapolate results to non-monitored SWBs within the same group.

The assessment of the chemical status has not have been undertaken, and therefore the status of SWBs in each category is not known, save for in relation to 12 water bodies.

Ubiquitous persistent, bioaccumulative and toxic priority (uPBT) substances

According to Article 8a(1)(a) of the Environmental Quality Standards Directive, eight priority substances and groups of priority substances behave like ubiquitous, persistent, bioaccumulative and

³³ Anthracene, brominated diphenylether, cadmium, C10-13 chloroalkanes, DEHP, fluoranthene, hexachlorobenzene, hexabutadiene, hexachlorocyclohexane, lead, mercury, pentachlorobenzene, polycyclic aromatic hydrocarbons, tributyltin, dicofol, perfluorooctanesulfonic acid, quinoxyfen, dioxins and dioxin-like compounds, hexabromocyclododecane, and heptachlor and heptachlor epoxide.

³⁴ Note that as part of the approach to monitoring and chemical status, grouping of similar water bodies is allowed. The reporting of RBMP data needs to make clear when the monitoring was undertaken to support the chemical status assessment.



toxic substances.³⁵. These substances are generally expected to cause widespread exceedances, and their emissions can be challenging to tackle (e.g. due to long-range atmospheric transport and deposition). In order to show the progress made in tackling other priority substances, EEA EFTA States have the possibility to present the information related to chemical status separately for these substances.

For one lake water body (Tjörnin in Reykjavik) the EQS is exceeded for polycyclic aromatic hydrocarbons (PAHs) and perfluorooctanesulfonic Acid (PFOS) (both uPBT substances). For one river water body (Kópavogslækur), the EQS is exceeded for the PAH benzo(a)cyrene.

4.1.3 Classification

Chemical status

Based on data from 12 SWBs, there are two SWBs in bad chemical status. These are a lake water body (Tjörnin) in Reykjavik and a river water body in (Kópavogslækur) in Kópavogur.

Beyond these 12 SWBs, the chemical status of the other water bodies is unknown.

Reasons for failing to achieve good chemical status of surface water bodies

For Tjörnin (lake water body), the following substances are listed as exceeding higher annual average concentration than allowed: perfluorooctanesulfonic acid, fluoranthene, benzo(a)pyrene (both poly aromatic hydrocarbons). Perfluorooctanesulfonic acid and benzo(a)pyrene are both uPBT substances. Additionally, other substances that were detected but are below the EQS threshold included: hexabromocyclododecane, chlorfenvinphos, terbutryn, hexachlorobenzene and anthracene. For Kópavogslækur (river water body), benzo(a)cyrene and cypermethrin are listed as exceeding higher annual average concentration than allowed.

4.2 Summary of gaps in implementation

- Chemical status is only available for 12 SWBs. This means that the chemical status of SWBs in Iceland is largely unknown.
- Chemical monitoring is not included in the monitoring plan. Details of monitoring as part of pollution permits lacks essential details such as monitoring frequency and substances covered.
- The monitoring plan does not cover priority substances, and states that little is known about which priority substances are relevant for Iceland.
- Information on the approach to classification of chemical status (e.g., grouping approaches, extrapolation, expert judgment etc.) is missing.
- Monitoring in sediment and biota is not included in the monitoring plan.³⁶
- Consideration of long-term trend analysis is largely missing.

5 Monitoring, assessment, and classification of quantitative status of groundwater bodies

Good groundwater quantitative status means the quantitative status required to meet the environmental objectives for groundwater bodies established under Article 4(1)(b) of the WFD. According to Annex V of the WFD a GWB will be in good quantitative status if:

• the available groundwater resource is not exceeded by the long-term annual average rate of abstraction;

³⁵ Brominated diphenylether, Mercury and its compounds, Polyaromatic hydrocarbons (PAH), Tributyltin, perfluorooctanesulfonic Acid, dioxins, hexabromocyclodecane and heptachlor.

³⁶ Iceland has clarified that there is no planned monitoring of sediment and biota due to prioritisation of funding.



- the groundwater levels and flows are sufficient to meet environmental objectives for associated surface waters and groundwater dependent terrestrial ecosystems; and
- anthropogenic alterations to flow direction resulting from level change do not cause saline or other intrusion.

5.1 Assessment of implementation and compliance with WFD requirements

5.1.1 Monitoring of quantitative status in groundwater

Iceland has delineated 313 GWBs.³⁷

There was no quantitative monitoring of GWBs up to 2021 and the national monitoring plan for the period 2022–2027 does not include any GWBs. However, the Icelandic Meteorological Office has submitted a list of 13 GWBs which need to be examined further, as they are potentially under significant pressures due to water abstraction and / or renewal caused by human activity.³⁸ Some of these GWBs are located in drinking water protected areas. A methodology for quantitative monitoring has been proposed by the Icelandic Meteorological Office.³⁹

5.1.2 Assessment of quantitative status for groundwater

The status of water bodies is based on a pressure analysis conducted in 2012-2013 by the Environment Agency of Iceland with stakeholders such as Water Region Committees. In the analysis, the water bodies were categorised into "not at risk", "in uncertainty", or "at risk". In connection to the RBMP, further data collection, analysis, and re-assessment of the water bodies in uncertainty and at risk was conducted.

The methodology for groundwater quantitative status assessment is described in the RBMP and does not consider the assessment of water balances and long-term groundwater level trends, the assessment of impacts on groundwater associated aquatic ecosystems, the assessment of impacts on groundwater dependent terrestrial ecosystems or the assessment of saline or other intrusions. Grouping of GWBs is not mentioned.

The RBMP states that the Icelandic Meteorological Office has submitted a proposal for a methodological approach to assess the quantitative status of cold groundwater. The proposed methodology takes into account water balances and groundwater associated aquatic ecosystems.

The RBMP also states that a groundwater model needs to be developed to cover the entire country, so that an overview of available groundwater resources can be achieved.

5.1.3 Classification of quantitative status for groundwater

The RBMP does not provide a WFD-compliant analysis of groundwater quantitative status in 2021 and at risk of not meeting good quantitative status by 2027.

Based on the Icelandic approach to assessment, no GWBs are "at risk" or "in uncertainty" regarding their quantitative status.

5.2 Summary of gaps in implementation

- The RBMP does not provide a WFD-compliant analysis of groundwater quantitative status in 2021 or at risk of not meeting good quantitative status by 2027.
- There are significant gaps in the methodology for the groundwater quantitative status assessment, since all elements used for groundwater quantitative status assessment are

³⁷ Iceland has stated that the total GWB area is 91,967 km², which is equivalent to the total area of the island, excluding the glaciers.

³⁸ Davíð Egilson, Gerður Stefánsdóttir and Tinna Þórarinsdóttir (2020). Proposals for groundwater bodies that may be under significant stress due to human-induced water abstraction and / or renewal. Icelandic Meteorological Office.

³⁹ Davíð Egilson, Jón Guðmundsson, Tinna Þórarinsdóttir and Gerður Stefánsdóttir (2019). Groundwater level.



missing. Water balances, groundwater level trends, groundwater associated aquatic ecosystems, groundwater dependent terrestrial ecosystems and saline or other intrusions are not reported to be considered in the groundwater quantitative status assessment.

• There was no quantitative monitoring of GWBs up to 2021. The national monitoring plan for the period 2022–2027 does not include any GWBs.

6 Monitoring, assessment, and classification of chemical status of groundwater bodies

Good groundwater chemical status means the chemical status required to meet the environmental objectives for groundwaters established under Article 4(1)(b) of the WFD.

A GWB will be at good chemical status if the following criteria are satisfied:⁴⁰

- General water quality: The concentrations of pollutants should not exceed the quality standards applicable under other relevant EEA legislation in accordance with Article 17 of the WFD.
- Impacts on ecosystems: The concentration of pollutants should not be such as would result in failure to achieve the environmental objectives specified under Article 4 of the WFD for associated surface waters nor any significant diminution of the ecological or chemical quality of such bodies nor in any significant damage to terrestrial ecosystems which depend directly on the GWB.
- Saline intrusion: The concentrations of pollutants should not exhibit the effects of saline or other intrusions as measured by changes in conductivity.

6.1 Assessment of implementation and compliance with WFD requirements

6.1.1 Monitoring of chemical status in groundwater

There was no chemical (surveillance or operational) monitoring of GWBs up to 2021. The national monitoring plan for the period 2022–2027 includes 9 GWBs that have operational licences and pollution permits. These will be monitored by the polluters as part of those permits. No GWBs are planned to be monitored with governmental funding.⁴¹

All substances causing risk of deterioration in chemical status are included in the monitoring plan for the period 2022-2027⁴². All Groundwater Directive Annex I and Annex II (Part B) substances and all of the WFD core parameters are also included in the monitoring plan.

6.1.2 Assessment of chemical status for groundwater

The methodology for groundwater chemical status assessment is described in the RBMP and it includes the assessment of general quality for a limited number of parameters. However, it does not consider groundwater associated aquatic ecosystems, groundwater dependent terrestrial ecosystems, saline or other intrusions or drinking water protected areas. Grouping of GWBs is not mentioned, However, the national monitoring plan states that the chemical status that will be determined in specific GWBs will be transferred to other GWBs or groups of GWBs with similar properties and similar pressures, once it has been classified.

⁴⁰ Common Implementation Strategy for the Water Framework Directive (2000/60/EC). Guidance Document No. 15. Guidance on Groundwater Monitoring, page 15.

⁴¹ Tables 6 and 7 of the national monitoring plan.

⁴² According to the national monitoring plan, if the risk assessment indicates that a GWB is at risk of not meeting the environmental objectives or if the monitoring indicates a poor chemical condition, operational monitoring must be carried out in the respective GWB. However, priority substances are not monitored in GWBs, unless they have been released into the relevant GWBs.



The status of water bodies is based on a pressure analysis conducted in 2012-2013 by the Environment Agency of Iceland with stakeholders such as Water Region Committees. In the analysis, the water bodies were categorised into "not at risk", "in uncertainty", or "at risk". In connection to the RBMP, further data collection, analysis, and re-assessment of the water bodies in uncertainty and at risk was conducted.

According to the RBMP, the chemical status of GWBs is based only on measurements of pH, electrical conductivity, nitrate, ammonium and other polluting chemicals which can cause pressure, according to the risk analysis.⁴³

General chemical assessment

The methodology for the assessment of the general chemical situation of a GWB does not elaborate on how the results from different monitoring stations on the same GWB will be synthesised, once such monitoring results become available.⁴⁴

Threshold values

The methodology for the establishment of threshold values and the specific threshold values for 10 parameters⁴⁵ are stipulated in Regulation No. 535/2011 on the classification of water bodies.⁴⁶ All Groundwater Directive Annex II (part B) substances are included, except for electrical conductivity, for which a specific threshold is not mentioned.

Trend assessment

The RBMP does not provide information on the existence and performance of a trend assessment methodology and a trend reversal methodology. However, reversal points have been established⁴⁷ for 10 parameters⁴⁸, suggesting that some elements of the trend reversal methodology are already established.

6.1.3 Classification of chemical status for groundwater

The RBMP does not provide a WFD-compliant analysis of groundwater chemical status in 2021 or of which water bodies are risk of not achieving good chemical status by 2027.

Based on the Icelandic approach to assessment, 1 out of the 313 GWBs (i.e., 0.3 % of total GWBs) is "at risk"⁴⁹ and 3 (i.e., 0.9 % of total GWBs) are "in uncertainty" regarding their chemical status. For the GWB at risk of not achieving good chemical status, the RBMP states that the pollution is multifaceted, including chlorocarbon compounds, oil, nitrates and organic solvents (trichloroethene and tetrachloroethene).

6.2 Summary of gaps in implementation

- The RBMP does not provide a WFD-compliant analysis of groundwater status in 2021 or GWBs at risk of not achieving good chemical status by 2027.
- The methodology for groundwater chemical status assessment does not to consider groundwater associated aquatic ecosystems, groundwater dependent terrestrial ecosystems, drinking water protected areas and saline or other intrusions.

⁴³ Reference values are reported in Article 2.3 in Annex III of Icelandic Regulation No. 535/2011 on the classification of water bodies and in Icelandic Regulation No. 797/1999 on the prevention of groundwater pollution.

⁴⁴ Iceland has clarified that national authorities are currently working on a guidance document for the assessment of the chemical status of GWBs.

⁴⁵ Arsenic, cadmium, lead, mercury, ammonium, chloride, sulphate, nitrite, phosphate, sum of trichloroethylene and tetrachloroethylene.

⁴⁶ Annex III, section 2.3.4 (part B)

⁴⁷ Icelandic Regulation No. 535/2011 on the classification of water bodies, Annex III, Article 2.3.4 (part B).

⁴⁸ They are the same parameters with established threshold values: arsenic, cadmium, lead, mercury, ammonium, chloride, sulphate, nitrite, phosphate, sum of trichloroethylene and tetrachloroethylene.

⁴⁹ The relevant GWB is 104-115-2-G (Rosmhvalanes 2), which is located close to the Keflavík Airport, the airport area of a historical USA defence force, urban areas, industrial plants and landfills.



- There was no chemical monitoring of GWBs up to 2021.
- No information is reported about the establishment of a threshold value for electrical conductivity, as required by the Groundwater Directive.
- The RBMP does not provide information on the existence and performance of a trend assessment methodology and a trend reversal methodology.
- Threshold values and reversal points may need to be established for additional substances, after the carrying out of a WFD-compliant classification of status and risk analysis for those GWBs not achieving good status.

7 Designation of heavily modified and artificial water bodies and definition of good ecological potential

Many SWBs have been heavily modified in their physical structure to serve various uses including navigation, flood protection, hydropower, and agriculture. In many cases, it is neither viable nor desirable from a socio-economic perspective to abandon such uses and to remove the physical modifications which affect the water bodies that would be required to bring them to good ecological status, which refers to a nearly natural undisturbed condition. EEA EFTA States can, thus, designate such water bodies as HMWBs whose environmental objective is good ecological potential instead of good ecological status.

7.1 Assessment of implementation and compliance with WFD requirements

7.1.1 Designation of heavily modified and artificial water bodies

In Iceland, 35 river water bodies and 20 lake water bodies have been provisionally identified as artificial or heavily modified. The designation of HMWBs and AWBs is not yet complete.

The RBMP states that water bodies proposed to be defined as heavily modified or artificial are under hydropower pressures. No other uses or activities have been examined but are due to be included in the next stage of assessment. These will include floodplain alterations, road construction and drainage.



Figure 7.1 Percentage of surface water bodies that have been provisionally identified as heavily modified or artificial in the $1^{\mbox{st}}$ RBMP

Approach for the designation of HMWBs and AWBs



Designations of HMWB and AWB are not complete in Iceland. However, work on the identification of possible water bodies to be defined as such that are under hydropower pressures has been done and a primary list of such water bodies presented in a special report in 2020.⁵⁰ The working group involved in this work used the principles and part of the steps of CIS Guidance Doc No. 4⁵¹ but reordered certain steps. Changing the order of the steps is not considered to be an issue that would affect the outcome of the provisional assessment. The later steps for designation tests are not yet completed and as such Iceland has only provisionally identified its HMWBs. The initial focus has just been on hydropower schemes and further work is ongoing to determine the impact of other activities on water bodies. The benefits served by the modified characteristics of the water bodies affected by activities other than hydropower have not been identified. However, the report states that in cases where the necessary mitigation measures in order for a water body to meet the criteria for good ecological status would have a significant and detrimental impact on factors that are socially important, and when improvements are not technically feasible or the costs are disproportionate, the relevant authority, the Environment Agency of Iceland, will define the SWB as a HMWB.

The possible water bodies consist of 15 water bodies proposed as AWBs and 40 water bodies proposed as HMWBs.⁵² The condition of HMWBs is estimated based on ecological potential, including biological and physio-chemical elements.

The RBMP states that in the next cycle, more research will be done to finalise the definitions. This includes pressure analyses and estimating hydrological changes and ecological status to determine if the water bodies are in fact HMWBs or AWBs.

Criteria for the significant adverse effects and if specific thresholds have been specified

According to WFD Article 4(3)(a), EEA EFTA States may designate a HMWB only if the changes to the hydromorphological characteristics of that water body which would be necessary for achieving good ecological status (i.e., restoration or mitigation measures) would have significant adverse effects on its uses or the wider environment.

The criteria for significant adverse effects have not been defined for Iceland.

Checking whether the beneficial objectives served by the modifications of the HMWBs cannot reasonably be achieved by other means

According to WFD Article 4(3)(b), EEA EFTA States may designate a HMWB only if an assessment of whether the benefits served by the modified characteristics of the water body cannot reasonably be achieved by other means which are a significantly better environmental option.

The methodology for checking beneficial objectives in this regard has not been applied as Iceland has only provisionally identified its HMWBs. However, in the special report for the identification of HMWBs and AWBs in hydropower areas⁵³, it is stated that this designation test will be applied to the water bodies provisionally identified.

7.1.2 Definition of good ecological potential for heavily modified and artificial water bodies

Definition of good ecological potential

According to the RBMP, the condition of HMWBs is estimated based on ecological potential, including biological and physio-chemical elements, however, the classification system for HMWB and AWB still needs to be established. The chemical status of HMWBs follows the same environmental quality

⁵⁰ Available at: https://ust.is/library/sida/haf-og-

vatn/Mannger%c3%b0%20og%20miki%c3%b0%20breytt%20vatnshlot_LOKASk%c3%bdrsla_28.8.2020.pdf ⁵¹ Available at: https://circabc.europa.eu/sd/a/f9b057f4-4a91-46a3-b69a-

e23b4cada8ef/Guidance%20No%204%20-%20heavily%20modified%20water%20bodies%20-

^{%20}HMWB%20(WG%202.2).pdf.

⁵² Iceland has clarified that further updates have been completed since 2022, with a total of 59 water bodies now provisionally identified as artificial or heavily modified.

⁵³ Available at: https://ust.is/library/sida/haf-og-

 $vatn/Mannger\%c3\%b0\%20 og\%20 miki\%c3\%b0\%20 breytt\%20 vatnshlot_LOKASk\%c3\%bdrsla_28.8.2020.pdf.$



requirements for priority substances as SWBs. AWBs and HMWBs shall have good ecological potential and their chemical status shall be good.

The RBMP states that the boundaries between the condition categories for the ecological potential of HMWBs and AWBs have not yet been determined, but work will be done on this during the period of validity of the RBMP.

The approach used to assess good ecological potential

The classification system for HMWB and AWB had not yet been established in Iceland at the time of this RBMP^{54} .

Biological assessment

The RBMP makes a general point that the same biological and physico-chemical quality elements should be used for HMWBs and AWBs as for natural SWBs. The boundaries for status categories of the quality elements for HMWBs and AWBs have not been determined in Iceland yet, but will be done in this RBMP cycle. In the next cycle, research will be completed to assess the existing pressures and ecological potential of HMWBs and AWBs.

The comparison between good ecological potential and good ecological status

The only information provided on the comparison between good ecological potential and status is that the quality elements which are suitable for classification of the ecological potential can vary, compared to natural water bodies.

Quality elements

The RBMP states that the ecosystem in AWBs and HMWBs shall be classified as maximum ecological potential, good ecological potential, and not satisfactory ecological potential. However, the techniques used for the estimation of biological values of biological quality elements for maximum ecological potential and good ecological potential have not been developed.

Mitigation measures for defining good ecological potential

Good ecological potential is a less stringent objective than good ecological status because it allows for the ecological impacts resulting from those physical alterations that (i) are necessary to support a specified use or (ii) must be maintained to avoid adverse effects on the wider environment. Good ecological potential therefore reflects the requirement to address other pressures, including physical pressures, not associated with the specified use, while ensuring that the adverse ecological effects of the physical alteration can be appropriately mitigated without undermining the benefits they serve. Mitigation measures are not yet included in the RBMP.

7.2 Summary of gaps in implementation

- The work to define AWBs and HMWBs has not yet been completed.
- The criteria for significant adverse effects and whether beneficial objectives can be achieved without affecting the modification under WFD Article 4(3)(a)) have not yet been defined.
- An ecological classification system for AWBs and HMWBs has not yet been developed for Iceland. The difference between good ecological status and good ecological potential is yet to be defined.

⁵⁴ Iceland has clarified that a methodology for determining the ecological potential of HMWBs was subsequently developed for Iceland in 2024. The methodology was created to harmonise the approach for assessing ecological potential with other European countries. A reference approach is used if there are sufficient data on biological quality elements and the relationship with hydromorphological conditions is understood. If sufficient data are not available then a mitigation measures approach will be used, which is based on appropriate mitigation measures that will benefit the ecosystem.

8 Exemptions to the environmental objectives

The environmental objectives are defined in Article 4 of the WFD. These require the EEA EFTA States to prevent the deterioration of status of all water bodies and to protect, enhance and restore⁵⁵ all water bodies with the aim of achieving good water status or potential by 2024.⁵⁶ The aim is long-term sustainable water management based on a high level of protection of the aquatic environment.

Exemptions to the general objectives allow for the extension of the deadlines, less stringent objectives, temporary deterioration, or deterioration for the implementation of new projects, provided a set of conditions are fulfilled and the required justifications are provided in the RBMPs.

8.1 Assessment of implementation and compliance with WFD requirements

Iceland has not yet determined the status of its water bodies, which is a major issue. This limits the understanding of the gap to target and what measures are necessary to achieve set environmental objectives.

The RBMP does not report the application of any exemptions to the environmental objectives.

9 Programme of Measures

Under Article 11 of the WFD, EEA EFTA States must set up PoMs as part of their RBMPs. These are the actions that are required to be implemented to address the significant issues identified and to allow the achievement of the objectives established under Article 4.

The Key Types of Measures (KTM) referred to in this section are groups of measures identified in the PoMs which target the same pressure or purpose. The individual measures included in the PoMs should be grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose, but also because the KTMs are not completely independent silos. KTMs were introduced to simplify the reporting of measures and to reduce the very large number of supplementary measures reported by some States.⁵⁷

'Basic measures' are listed in Article 11(3) WFD. These are the minimum measures to be complied with. 'Supplementary measures', as referred to in Article 11(4) WFD, are those measures designed and implemented in addition to the basic measures, with the aim of achieving the objectives established pursuant to Article 4 WFD.

A KTM may be one national measure, but it would typically comprise more than one national measure. The 25 predefined KTMs are listed in the WFD Reporting Guidance 2022.

The KTM should be fully implemented and made operational within the RBMP planning period to address specific pressures or priority substances and achieve the environmental objectives.

9.1 Assessment of implementation and compliance with WFD requirements

9.1.1 General issues

An indication as to whether measures will be fully implemented and made operational is when they have been reported as being planned to tackle significant pressures (at the KTM level). Significant pressures should also be reported at the water body level. Measures should be planned in the RBMPs to tackle all significant pressures, with at least one KTM assigned to each pressure.

Iceland's RBMP lists 49 basic measures and 8 supplementary measures split into six thematic groups of measures:

⁵⁵ The obligation to restore does not apply to HMWBs.

 ⁵⁶ In accordance with the timelines as adapted to the EEA Agreement by Joint Committee Decision No 125/2007.
 ⁵⁷ WFD Reporting Guidance 2022, page 47. Available at:

https://cdr.eionet.europa.eu/help/WFD/WFD_715_2022/Guidance%20documents/WFD%20Descriptive%20Reporting%20Guidance.pdf



- A. Further development of a classification system, mapping and analysis of stress and data collection 18 basic measures
- B. Increased administration in work permits and through supervision of activities that cause stress on water bodies -10 basic measures
- C. Educating and guiding the public and business owners to deal with water resources, sewage issues, drug residues and chemical issues 2 basic measures, 2 supplementary measures
- D. Preparation of monitoring of water bodies 3 basic measures
- E. Improvements of sewerage systems and treatment 16 basic measures
- F. Implementing countermeasures for water bodies that are currently at risk 6 supplementary measures.

There is no mention of how measures have been assigned to the predefined KTMs. Measures have been described under each of these six thematic groups e.g. for group A, measures include regularly summarising the data on water bodies such as the delineation of water bodies, types of stress and actions related to the water bodies.

The PoM states that the measures, which have been approved by the Minister for the Environment and Natural Resources, are binding for involved authorities. The responsibility for executing the measures will be spread across different sectors, both among those within the administration and those who use water resources. For each measure, there will be a responsible party who ensures the measures are carried out.

Qualitative cost-effectiveness analysis of measures

Cost-effectiveness analysis is an appraisal technique that provides a ranking of alternative measures to achieve set environmental objectives on the basis of their costs and effectiveness, where the most cost-effective has the highest ranking.

The PoM states that measures have been prioritised according to importance, but also to balance costs between years and distribute work components. Emphasis was placed on prioritising measures that achieve the greatest benefits right from the beginning of the RBMP cycle. There is a lack of clarity regarding whether and how a cost-effectiveness analysis has been carried out for the measures.

Financing of measures

According to the PoM, the largest part of the costs of the measures planned will be financed by the State and municipalities (public budget) but they will be financed partly by the private sector since industrial companies need to improve their practices in sewerage, incurring costs.

Measures to improve sewerage are very extensive in this RBMP, as improvements are needed in many places. The PoM states that an amendment will be made to the Icelandic Act No. 9/2009 on the development and operation of sewers, which stipulates that in the years 2020-2030, a contribution from the State shall be for part of the cost of municipal sewer construction.

Despite mentioning who will be responsible for financing the measures, there is nothing in Iceland's RBMP highlighting the cost of the measures.

Coordination with other directives

In the PoM, Iceland includes a list of directives which it has implemented as part of the EEA Agreement for water management laws.

One measure in this area is to establish a forum for cooperation among the institutions responsible for the implementation of regulations for drinking water and groundwater. The group shall make recommendations on the division of roles between institutions in connection with the implementation of the new Drinking Water Directive.

Prioritisation of measures

Measures are prioritised according to importance, but also to balance costs between years and distribute work components. Emphasis was placed on prioritising measures that achieve the greatest benefits right from the beginning of the water cycle.



It is unclear what methodology Iceland used to reach these conclusions.

9.1.2 Pressures for which gaps need to be filled to achieve WFD objectives and the KTMs planned to achieve objectives

EEA EFTA States are required to report the gaps that need to be filled to achieve WFD environmental objectives in terms of all significant pressures on surface waters and groundwaters, in terms of priority substances causing failure of good chemical status and in terms of RBSPs causing failure of good ecological status or good ecological potential.

EEA EFTA States were expected to report which KTMs are to be made operational to reduce the gaps to levels compatible with the achievement of WFD environmental objectives.

Iceland does not report their gap indicators, nor do they map their measures to KTMs. Therefore, it is not clear what the current gaps to achieving good status are, nor is it evident to what extent pressures are affecting water bodies.

9.2 Summary of gaps in implementation

Iceland does not assign their national measures to KTMs or significant pressures.

The RBMP does not report on costs of measures nor on specific approach(es) used to prioritise measures and assess their cost-effectiveness. In particular, there is a lack of reporting and lack of clarity regarding whether and how cost-effectiveness analysis has been carried out for measures.

Furthermore, the RBMP does not report the gap indicators, and it is therefore not clear what the current gaps to achieving good status are, nor is it evident to what extent pressures are affecting water bodies.

10 Measures related to abstractions and water scarcity

Water abstraction can be one type of significant pressure in an RBD and at the water body level, and may come from different sectors, in particular household and other urban uses, agriculture, industry, and energy. Within the assessment framework of the WFD, abstraction pressures are clearly linked to the quantitative status of GWBs. Furthermore, water abstraction pressures are linked with the assessment of the hydromorphological elements of SWBs, which supports the overall assessment of ecological status.

10.1 Assessment of implementation and compliance with WFD requirements

10.1.1 Water abstraction and trends

Water abstraction (understood as consumptive use or net consumption) is not identified as a significant pressure in Iceland. Iceland is, therefore, not expected under the WFD reporting guidance to report data on Water Exploitation Index+.⁵⁸

Water abstraction was not included in the pressure analysis of the RBMP because it was not considered significant at the time of drafting the RBMP. However, in 2019, the Icelandic Meteorological Office submitted a list of 13 GWBs which are potentially under significant pressures due to water abstraction and / or recharge, caused by human activity. Therefore, the pressure analysis will need to be re-evaluated for the next RBMP, to address the updated findings on water abstraction.

⁵⁸ The Water Exploitation Index+ (WEI+) compares water consumption against renewable water resources. The European Environment Agency publishes the assessment water scarcity conditions in Europe: https://www.eea.europa.eu/en/analysis/indicators/use-of-freshwater-resources-in-europe-1.



10.1.2 Main water uses

The RBMP includes estimates of water uses and their trends based on obsolete data compiled before 2011. For example, the RBMP refers to a report from 2011⁵⁹ that discusses the use of water in Iceland by the public, businesses and outdoor recreation activities (e.g. swimming pools). A forecast is also presented for the use of cold water up to 2015. Total use of cold water in Iceland was estimated at 200 million tonnes in 2003. Public utilities distributed 82 million tonnes of the cold water (41 %) to the public. The use for aquaculture amounted to about 66 million tonnes (33 %). Heat converters, which are used by hot water distribution services, used 25 million tonnes (12.5 %) and power-intensive industries used 16 million tonnes for their operations (8 %). The rest was used by other activities. The annual use of cold water was forecasted to grow to 250 million tonnes by 2015.

The above estimations do not include the use of water by hydropower plants and geothermal plants. In 2009, the total electricity production from hydropower plants amounted to about 12,000 GWh, while 4,500 GWh were generated with geothermal plants. The electricity generation capacity had increased significantly over the last two decades. A rough estimate indicates that Landsvirkjun, which is the state-owned electricity generation company, used about 42 billion tonnes of water annually to generate electricity, mainly from glacial rivers.

Moreover, hot water distribution services supplied about 140,000 tonnes of hot water in 2008 to approximately 295,000 users. The annual use of hot water has been estimated between 300-350 tonnes per person, but this varies across different regions.⁶⁰

10.1.3 Measures related to abstractions and water scarcity and abstractions

Regarding basic measures to control abstraction from surface and groundwater (referred in Article 11(3)(e) WFD), there is a permitting regime to control surface and groundwater abstractions and impoundments. Furthermore, there is a register of abstractions from surface water and groundwater and a register of impoundments. Small abstractions are defined with certain thresholds⁶¹ and those under the threshold are exempted from controls. Permits are issued by competent authorities, who define their duration based on data and information contained in the technical substantiation documentation. The national legislation⁶² does not provide a periodic review of the permits after a specified period. However, the national legislation provides that permits can be refused or revoked if the specific conditions imposed in the permit are violated (e.g. environmental requirements).

Ecological flows have not been established and implemented for any water body.

The RBMP and PoM include some measures related to abstractions and water scarcity issues. One type of measure is studies to assess the pressures on water bodies. Another type of measure is the preparation of water saving education material and guides to increase public awareness on good practices and sustainable water management.

10.2 Summary of gaps in implementation

- The RBMP includes estimates of water uses and their trends based on obsolete data compiled before 2011.
- Periodic review of the permits is not reflected in the Icelandic legislation.
- Ecological flows have not been established or implemented for any water body.

⁵⁹ Available at: <u>https://ust.is/library/Skrar/Atvinnulif/Haf-og-</u>

vatn/Vatnatilskipun/Hagfr%c3%a6%c3%b0ileg%20greining%20vatnsnotkunar%202011-C11_04.pdf.

 ⁶⁰ This corresponds to an annual energy use for space heating between 60-70 GJ per capita.
 ⁶¹ 100 m³/day.

⁶² Icelandic Act No. 57/1998 on the survey and utilisation of ground resource

⁽https://www.government.is/media/atvinnuvegaraduneyti-media/media/acts/Act-No-57-1998-on-survey-and-utilisation-of-ground-resources.pdf).



11 Measures related to pollution from agriculture

Pollution pressures from agriculture include point sources and diffuse pollution sources. Agricultural point sources are generally linked to the farm buildings and farmyard and associated infrastructure, including livestock feeding areas, wastewater treatment lagoons or manure / slurry storage areas in livestock agriculture or from handling, mixing and equipment washdown areas for pesticides, fertilisers and fuel storage. The application of fertilisers, slurries, manures and pesticides to arable land can lead to diffuse pollution if applied in excess of the crops' needs or during inappropriate climatic conditions. Diffuse pollution refers to the release of potential pollutants (i.e. nitrogen, phosphorus, pesticides) from a range of activities that individually may have minimal effect on the water environment but at the catchment scale can have a significant impact. Agricultural soil itself, where eroded, can also be a pollutant, releasing sediment and suspended solids to the water environment. To address agricultural pollution the EEA EFTA States are required to implement basic and supplementary measures.

This inclusion of measures related to pollution from agriculture as a separate topic is due to this being the most common pressure across Europe. However, Iceland has clarified that agriculture is not identified as a significant pressure for water bodies in Iceland.

11.1 Assessment of implementation and compliance with WFD requirements

11.1.1 Use of measures

Iceland has not assigned any of their measures to KTMs, therefore it is difficult to see whether measures do or do not apply to the agriculture sector in several instances. Instead, Iceland has assigned their measures to six 'thematic groups' (as highlighted in section 9.1.1). The measures which mention either 'agriculture' or 'farming' come under three of these groups:

- B Increase administration in work permits and through supervision of activities that cause stress on water bodies. There is one measure under this issue group aiming to classify sensitive areas of agriculture amongst other commercial activities, including areas that are sensitive to nitrogen and creating measures to combat nitrogen pollution.
- C Educating and guiding the public and business owners to deal with water resources, sewage issues, drug residues and chemical issues. The two measures under this issue group aim to consult and cooperate with the agriculture sector and update the code of good practices for farmers.
- E Improvements of sewerage systems and treatment, under which all measures applied are classed as 'basic' measures. One measure in this group covers the classification of sensitive areas and the protection of these zones against nitrogen compounds from agricultural and other sectors.

There is a lack of information as to how these measures will help reduce the pressures coming from agricultural measures.

Regarding nitrate pollution, areas vulnerable to nutrient pollution have not yet been defined for the whole of Iceland. Only one area, the lake water body Þingvallavatn, has been defined as sensitive to nitrogen pollution.

The PoM includes measures about developing procedures for classifying sensitive areas, considered vulnerable to nutrient eutrophication, and the sorting and defining these areas. Regarding objectives, the RBMP refers to Icelandic Regulation No. 804/1999 on the prevention of water pollution caused by nitrogen compounds from agriculture and other commercial activities. The objective of that regulation is to reduce and limit water pollution caused by nitrogen compounds from agriculture of areas vulnerable to nutrient eutrophication will be carried out in accordance with the requirements of this regulation.

11.1.2 Funding of measures

Five measures related to agriculture are in the PoM, however, the source of financing for these measures has not been described by Iceland.



11.1.3 Gaps and distance to target

There is some information about nutrient loading estimates from agriculture and of the use of pesticides in Iceland in the RBMP, but the extent to which these two pressures need to be reduced has not been reported.

The results of pressure analysis⁶³ and a report⁶⁴ from 2019 which assessed possible water pollution due to agriculture in Iceland both suggest that the pressure from agriculture is mainly due to traditional agriculture, and fertiliser use in areas with the highest density of agriculture next to rivers and intensive livestock farming (e.g. poultry and pigs). In 2019, agricultural land was estimated to cover about 2.5 % of Iceland's surface, of which 97 % was meadows and pastures. In 2020, about 11,400 tonnes of nitrogen and 1,700 tonnes of phosphorus were applied to crops as fertiliser in agriculture in Iceland. There is no information on how much livestock manure is generated.

Most plant protection products are used in areas where various types of agricultural cultivation are practiced as well as sports fields other than golf courses, private and public parks and open green areas. The use of plant protection products in Iceland in 2018–2020 was on average 1,349 kg of active substance per year. The use of the chemicals is not considered to have a significant impact on the quality of water in Iceland.

It is not clear within the RBMP how Iceland plans to reduce the risk of these pesticides and fertilisers. The gap to good status is not explicitly mentioned.

11.2 Summary of gaps in implementation

- Several key aspects are missing regarding measures to tackle pressures from agriculture, including the methods of financing the measures, the assigning of the measures to KTMs and the gaps which need to be achieved by the measures before good status is achieved.
- There is also a lack of quantified gaps for preventing nutrient loads, pesticides and veterinary pharmaceuticals.

12 Measures related to pollution from sectors other than agriculture

In the context of this topic, pollution is considered in terms of nutrients, organic matter, sediment, saline discharges and chemicals (priority substances, RBSPs, groundwater pollutants and other physico-chemical substances) arising from all sectors and sources apart from agriculture. This includes urban wastewater treatment works, other industry, urban areas, forestry, transport, aquaculture and energy production. It deals with the pollution of surface waters and groundwater.

There are two broad categories of measures that could be established for the control and reduction of pollution from non-agricultural sources of nutrients, organic matter and chemicals for an RBD:

- measures referring to the source of pollution that allow the reduction / phasing-out of more than one pollutant (for e.g. wastewater treatment process); and
- measures related to the substance (e.g. priority substances, RBSPs or nutrients) causing the pollution (e.g. banning of substance, limitation of one of its specific uses).

⁶³ Available at: https://www.ust.is/library/Skrar/Atvinnulif/Haf-og-

vatn/Vatnatilskipun/St%C3%B6%C3%B0usk%C3%BDrsla%20fyrir%20vatnasv%C3%A6%C3%B0i%20%C3%8Dslands %202013.pdf.

⁶⁴ Available at: https://www.ust.is/library/Skrar/Atvinnulif/Haf-og-

vatn/Vatnatilskipun/St%C3%B6%C3%B0usk%C3%BDrsla%20fyrir%20vatnasv%C3%A6%C3%B0i%20%C3%8Dslands %202013.pdf.



12.1 Assessment of implementation and compliance with WFD requirements

12.1.1 Key Types of Measures to tackle pollution from non-agricultural sources

The WFD specifies that PoMs shall include, as a minimum, "basic measures" and, where necessary to achieve objectives, "supplementary measures" when basic measures are not enough to address specific significant pressures.

The measures set out in the Icelandic PoM for pollution from sources other than agriculture are mainly focused on addressing sewerage issues in urban areas.

In the PoM, basic measures emphasise the update of the pressure analysis carried out in 2012-2013. Supplementary measures in this water cycle emphasise water bodies that have been defined as in uncertainty in reaching their environmental objectives due to the discharge of sewage and where the requirements of the Icelandic Regulation No. 798/1999 on sewers and sewage are not met.

The basic measures set out in the PoM are as follows:

- Analysis and risk assessment according to the results of priority chemical monitoring
- Implementation of the requirements of the regulation on protection against water pollution caused by nitrogen compounds from agriculture and other commercial activities
- Revision of the Icelandic sludge management regulation
- Education about water and sewage issue
- Preparation for monitoring priority substances in sediments and organisms
- Guidelines for septic tanks
- Guidelines for control measurements and monitoring for sewers
- Uniform operating permit conditions for sewers
- Operating licence for sewer
- Prioritisation of sewage works and follow-up
- Presentation of the requirements of the new regulation on sewers and sewage
- Wastewater treatment (various individual measures under this)
- Sewage treatment (various individual measures under this)
- Definition of safeguard zones

The additional measures set out in the PoM are as follows:

- Mitigation measures in Tjörnin in Reykjavík
- Overview monitoring in Rosmhvalanes 2
- Mapping of loads and activities in relation to Rosmhvalanes 2

12.1.2 Measures to address all drivers causing chemical pollution

The measures planned to address all drivers are:

- Analysis and risk assessment according to the results of priority chemical monitoring
- Implementation of the requirements of the regulation on protection against water pollution caused by nitrogen compounds from agriculture and other commercial activities

12.2 Summary of gaps in implementation

As detailed in topic 4 of this document, the chemical status of SWBs in Iceland is not yet known. Therefore, at this stage, there is not a clear link between the chemical status of water bodies and the planned measures.

13 Measures related to hydromorphology

Hydromorphological pressures can include variation in flow characteristics caused by physical barriers and / or channel modification; and sediment disposal, removal of substrate, and / or change in water level caused by dredging.

The main measures relevant to hydromorphology are:

- Improving longitudinal continuity (e.g., establishing fish passes, removing old dams).
- Improving hydromorphological conditions of water bodies other than longitudinal continuity (e.g., river restoration, improvement of riparian areas, removal of hard embankments, reconnecting rivers to floodplains, improvement of hydromorphological conditions of transitional and coastal waters, etc).
- Improvements in flow regime and / or establishment of ecological flows.
- Measures to reduce sediment from soil erosion and surface run-off (e.g., improvements to the condition of riverbanks or lake shoreline).
- Natural water retention measures (e.g., floodplain restoration and management, remeandering, stream bed re-naturalisation, restoration and reconnection of seasonal streams, reconnection of oxbow lakes, riverbed material re-naturalisation, removal of dams and other barriers and elimination of riverbank protection).
- Research, improvement of knowledge base reducing uncertainty.

13.1 Assessment of implementation and compliance with WFD requirements

The identification of KTMs has not yet been completed for Iceland. Hydromorphological pressure was not included in the pressure analysis carried out. According to the RBMP, in the next cycle more work must be carried out on hydromorphological pressures, this includes pressure analyses and estimating hydrological changes to determine HMWBs, along with a classification system for HMWBs and AWBs.

No work has yet been completed to identify basic measures to address hydromorphological pressures and no measures have been identified to identify how to achieve WFD objectives in relation to drought management.

Ecological flows have not been determined in Iceland. Ecological flows as well as obstruction of flow (barrier effect) are one of the influencing factors recommended to be used in the classification system for HMWBs and AWBs by the working group in Iceland (presented in a special report in 2020).

Nature-based solutions have not been established in Iceland.

13.2 Summary of gaps in implementation

No work has yet been completed to assess the hydromorphological pressures faced by water bodies in Iceland, and subsequently no work has been completed to identify measures that can address the hydromorphological pressures. Considering most of Iceland's power generation comes from hydropower, some environmental impacts can be expected. The lack of such assessment and associated measures is therefore considered a major gap.



14 Economic analysis

Article 5 of the WFD requires the EEA EFTA States to undertake an economic analysis of water use according to the specifications of Annex III. In addition, Article 13 and Annex VII of the WFD require the States to include summary reports of these economic analyses as part of the RBMP. Annex III of the WFD stipulates that the economic analysis of water use should contain enough information in sufficient detail to support the assessment of cost recovery for water services and related obligations (Article 9) as well as the judgments on the most cost-effective combination of measures in respect of water uses to be included in the PoMs.

14.1 Assessment of implementation and compliance with WFD requirements

14.1.1 Water services and water uses

The RBMP refers to a report from 2011 that lists water services in Iceland including supply of cold and hot water and sewerage services. The report also discusses the use of water in Iceland by households, industry and businesses and for outdoor recreation (e.g. swimming pools) as well as the value of water.

A baseline scenario is presented for cold water use up to 2015. The results about main water uses were as follows:

- Iceland was considered rich with water resources. Total usage of cold water in Iceland was estimated at 200 million tonnes in 2003. Public utilities distributed most of the cold water to consumers, or 82 million tonnes, while the consumption of aquaculture amounted to about 66 million tonnes in 2003. Heat converters, used by hot water distribution services, utilised 25 million tonnes and the power intensive industries 16 million tonnes for operations in 2003.
- Hot water distribution services distributed about 140,000 tonnes of hot water in 2008 to approximately 295,000 users. Annual usage of hot water was estimated as 300-350 tonnes per person but varied between regions. This corresponds to annual energy utilisation for space heating of 60-70 GJ per capita.
- In Iceland, electricity was mainly generated by hydropower plants. Total production amounted to about 12,000 GWh in 2009, while about 4,500 GWh of electricity were generated with geothermal plants. The electricity generation capacity had increased significantly in the last two decades. A rough estimate indicated that Landsvirkjun (state owned electricity generation company) used about 42 billion tonnes of water, mainly glacial rivers, to generate electricity each year.
- Annual usage of cold water was forecasted to grow to 250 million tonnes by 2015 which represented a 2 % increase from 2009.

Economic analysis has been carried out for the public, aquaculture, district heating, power supply, other industry, swimming pools, snow melting and electricity production. There is no update to the 2011 economic analysis reported in the RBMP.

14.1.2 Economic analysis update

The extent of information in the RBMP about the economic analysis is consistent with the data available at the time (2011). The PoM includes a measure to update the economic analysis of water uses.

In the 2011 economic analysis, there is an estimation of the value of cold-water services for the public and firms (cash flow analysis used), and economic benefits of geothermal energy for heating.

The data used for the economic analysis was as follows: information on population, population development, family size, migration, and house building. Trends in economic development and its impact on water supply and distribution services, trends in cold and hot water use in Iceland, including supplied quantities of cold and hot water, water use and efficiency of cold and hot water use as well as water use forecasts.



The analysis also included information on electricity production in Iceland (with hydro- and geothermal power plants).

14.1.3 Incentive function on water pricing

The RBMP notes the requirements of Article 9 of the WFD on incentive water pricing but provides little further information. In particular, the RBMP notes that the current water pricing system is not aligned with the requirements of the WFD due to the lack of volumetric water pricing.

In Iceland, water charges are linked to the value of the house and not billed based on water consumption. In particular, the charge for water supply (cold water supply) and sewerage services for households and small companies is calculated based on the property size as evaluated by Registers Iceland, and not actual water consumption. The water bill is payable jointly with property taxes.

Hot water supply is in most cases is metered and billed in accordance with metered consumption. Industries that use larger amounts of water for industrial purposes also are billed in accordance with metered consumption.

14.1.4 Calculation of the financial and broad cost recovery rate

The cost recovery analysis includes information on revenue and operating results in available annual accounts of water utilities, district heating utilities, and sewerage operations (distribution services) as well as electricity sales. Cost recovery ratios are calculated based on revenues and expenditure data. The supporting / background material comes from the 2011 report on economic analysis that has not yet been updated.

The cost of water services is reported at the national scale for Iceland as a whole. The financial statements of those utilities that provided disaggregated data show that in the period 2005-2009 distribution services for hot and cold water were run with a profit, except in the year 2008. By contrast the sewerage systems were not making profit during the same years, with serious losses experienced in the year 2008.

The analysis considers revenues from cold and hot water supply and sewerage services and the recovery of water service costs. Information is presented on how the prices of cold water and sewerage services is calculated, and the cost of installing cold water meters.

14.1.5 Environmental and resource costs

The RBMP does not provide information on (calculating) environmental and resource cost.

The RBMP mentions the requirements of Article 9 of the WFD on recovery of costs of water services including environmental and resource cost but provides no further information.

14.1.6 Information provided on the application of the polluter pays principle

The RBMP does not provide information on the application of the polluter pays principle.

14.2 Summary of gaps in implementation

- No updates to the 2011 economic analysis have been made including for financial costrecovery analysis.⁶⁵
- The RBMP refers to the requirements of Article 9 of the WFD in relation to environmental and resources but does not provide any information on these costs in Iceland. Similarly, the RBMP does not mention the polluter pays principle.

⁶⁵ Iceland has clarified that the updated report on economic analysis was in progress prior to publication of this report and was being prepared for publishing.



• The RBMP refers to the requirements of Article 9 of the WFD in relation to incentive water pricing and notes that current water pricing system is not aligned with the requirements of the WFD due to the lack of volumetric water pricing.

15 Considerations specific to protected areas (identification, monitoring, objectives and measures)

According to Article 6 of the WFD, the EEA EFTA States shall ensure the establishment of a register or registers of all areas lying within each RBD which have been designated as requiring special protection under specific EEA legislation for the protection of their surface water and groundwater. Additional specific objectives, concerning water management, should be set for the specific areas to achieve the level of protection required under the relevant legislation (e.g. the Drinking Water Directive or the Urban Wastewater Treatment Directive).

15.1 Assessment of implementation and compliance with WFD requirements

The RBMP refers to Natura 2000 and the Habitats Directive and the Birds Directive, even though these are not binding upon Iceland. According to the RBMP, Iceland has a nature conservation law which somewhat corresponds to those directives. Around 100 areas in Iceland are protected under national law, and 23 are protected based on their uniqueness relating to aquatic organisms. The areas covered by these protections include:

- water bodies where drinking water intake takes place and intended for such water intake in the future;
- water bodies protected for economically important species of aquatic organisms;
- water bodies designated as recreational waters;
- areas that are sensitive to nutrients, including areas that have been assessed as at risk according to the regulation on the prevention of water pollution caused by nitrogen compounds from agriculture and other commercial activities; and
- areas designated for the protection of habitats or species.

Based on Act No. 48/2011 on plan for protection and energy use⁶⁶, several areas are not allowed to be used for energy harnessing. The sites are categorised regarding water, geothermal or wind energy.

15.1.1 Monitoring sites for protected areas

Monitoring of protected SWBs takes place in water sources or in drinking water protection zones. Pollutants according to the Icelandic drinking water regulation that have maximum values are also the only additional requirements for monitoring within protected areas. No further information has been provided for monitoring of SWBs within protected areas.

Monitoring of GWBs within protected areas is governed by the general provisions on groundwater monitoring in regulations on the classification of water bodies, their properties, stress analysis and monitoring and within drinking water regulations. There are no additional monitoring requirements for protected areas within GWBs associated with the protection.

15.1.2 Protected areas and ecological status

The status of water bodies associated with protected areas is not available as ecological status of SWBs is not established.

15.1.3 Additional objectives

No information on additional objectives has been provided in the documentation.

⁶⁶ Lög um verndar- og orkunýtingaráætlun.



15.1.4 Additional measures

The PoM identifies that eight additional measures are to be actioned. Only one of these is relevant to the protected areas outlined above.

The additional measure is to define safeguard zones for the protection of drinking water sources. This includes mapping to define protection zones at a water source, so the protection zones are equivalent to the existing well and adjacent areas according to Icelandic law.⁶⁷ Three types of zones are defined: well zone, neighbouring zone and remote zone with higher protection closest to the well.

15.2 Summary of gaps in implementation

There is only limited information identified on the additional objectives and measures being set for the protection of water bodies associated with protected areas in Iceland

16 Adaptation to drought and climate change

Climate variability and change should be considered in the implementation of water policy and therefore in river basin management planning. Climate change consideration includes using climate change projections to inform the assessment of pressures and impacts, configuration of monitoring to detect future climate change impacts, and the selection of measures that are robust to possible projected climate conditions.

16.1 Assessment of implementation and compliance with WFD requirements - climate change adaptation

Iceland has a national Climate Change Adaptation Strategy⁶⁸, which was published in 2021 (i.e. before the adoption of the RBMP in 2022). A national plan for adaptation to climate change has also been prepared, based on the strategy.⁶⁹ Neither is referred to in the RBMP. However, the RBMP refers to the national Scientific Committee on Climate Change and its activities.

The RBMP states that climate change aspects will be considered in the next RBMP, focusing on decreasing greenhouse gas emissions, assessing how climate change will affect the water environment and assessing how monitoring and other measures need to integrate climate change considerations. The RBMP does not present any measures related to climate change adaptation. However, it is stated that measures included in the PoM shall have the least negative environmental impact and the impact of climate change on water resources shall be explored. A climate proofing of measures is not provided. There is also no reference to water scarcity or drought risks and there are no relevant measures. The RBMP does not include an analysis of the projected impacts of climate change and drought on the ecological and chemical status of water bodies.

16.2 Summary of gaps in implementation

- Although Iceland has a national Climate Change Adaptation Strategy published in 2021 and a national plan for adaptation to climate change published in 2020, these are not referred to or considered in the RBMP
- The RBMP does not include an analysis of the projected impacts of climate change and drought on the ecological and chemical status of water bodies.
- The RBMP does not include any measures explicitly targeting climate change, water scarcity and drought.

⁶⁷ Icelandic Regulation 536/2001 on drinking water and Icelandic Regulation No. 796/1999 on prevention of water pollution.

 ⁶⁸ Available at: https://climate-adapt.eea.europa.eu/en/countries-regions/countries/iceland.
 ⁶⁹ Available at:

https://www.government.is/library/Files/Icelands%20new%20Climate%20Action%20Plan%20for%202018%202030.pdf.