DECEMBER 2021
LANDBRUG & FØDEVARER

UNDERSØGELSE AF ASPEKTER OMKRING VANDPLANER I DANMARKS NABOLANDE

ENDELIG RAPPORT

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DECEMBER 2021
LANDBRUG & FØDEVARER

COUNTRY REPORT FOR NETHERLANDS

FINAL REPORT

PROJECT NO.

A231827

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
Final	Dec. 1. 2021	Report	LOCW	LSSA	JDCR

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Country report for the Netherlands

Delimitation

Table 1: Status on Water Plan 2, the Netherlands

Country	Status on WP2	Link to WP2	Comment
The Netherlands			
- Rhine	Under implementation	*National RBMP Rhine* *International RBMP Rhine*	
- Meuse	Under implementation	*National RBMP Meuse* *International RBMP Meuse*	
- Scheldt	Under implementation	*National RBMP Scheldt* *International RBMP Scheldt*	
- Ems	Under implementation	*National RBMP Ems* *International RBMP Ems*	

Table 2: Status on Water Plan 3, the Netherlands

Country	Status on WP3	Link to WP3	Comment
The Netherlands	Draft, open for consultation	*Draft river basin management plans 2022-2027 - Water helpdesk (helpdeskwater.nl)*	All 4 river basins are presented in one common document

Table 3: Delimitation of the analysis, the Netherlands

Country	River basin management plans
The Netherlands	Rhine, Meuse, Scheldt, Ems

1 Country context and analysis

The figure below presents the distribution of the four river basin units (RBU). Going from the Southwest towards Northeast, the RBUs presented are Scheldt, Meuse, Rhine, and Ems. As can be seen, the Rhine RBU extends over the majority of the country, accounting for an area of 28.500 km2 out of 43.000 km2 (or 66%).

Figure 1: Overview of river basin units and land cover in the Netherlands. Brown lines indicate the borders of the RBUs. Source: Ontwerp Stroomgebiedbeheerplannen 2022-2027, link

The figure below presents the land cover in the Netherlands. Due to the absence of available data, only the land cover for the national level is available. Based on 2012 data, it can be seen that agriculture composes 66% of the land cover, of which the majority (28%) is in the form of grasslands. Also artificial cover accounts a large share with about 15%.

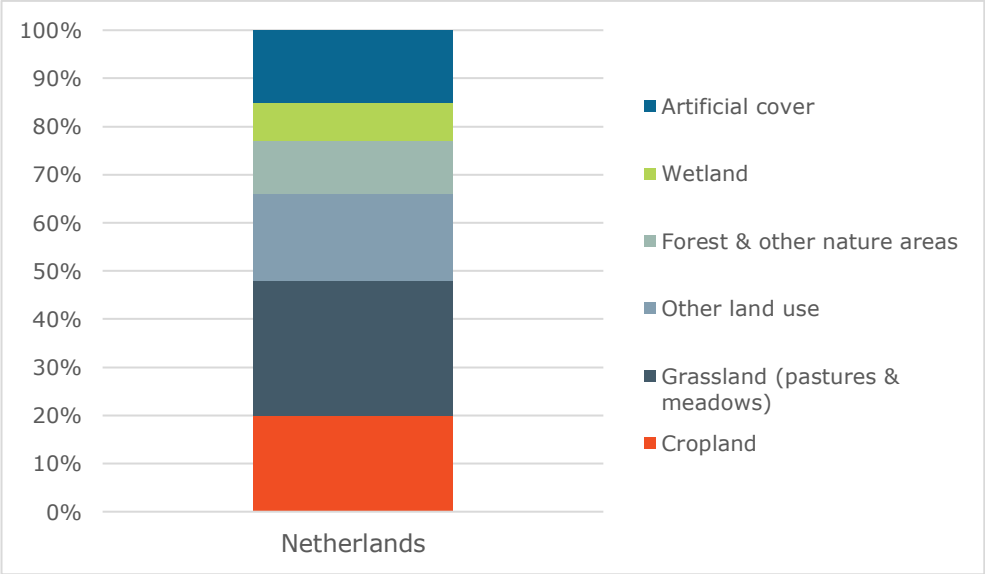

Figure 2: Land cover of the Netherlands (% distribution). No data could be identified in the 3rd RBMPs. Therefore, land cover data from 2012 is applied. Source: CORINE land cover in 2012

Table 4 presents the number of waterbodies by water type and RBU, showing that the number of coastal waterbodies is low when compared to other countries, such as Germany or Denmark. Territorial waters are coastal waters located 1-12 nautical miles away from the coast, for which only the chemical status needs to be assessed.[1] Territorial waters are thus a sub-type of coastal waters and are isolated for the purpose of this study to only include coastal waters subject to a target of good ecological status.

Table 4: Overview of the number of waterbodies by water type and RBU

	Territorial waters	Coastal waters	Transitional waters	Rivers	Lakes	Total
Eems	1	1	1	5	14	22
Meuse	1	1	1	100	58	161
Rijn	1	4	3	127	369	504
Scheldt	1	3	1	1	50	56
Total	4	9	6	233	491	743

Source: Waterkwalitetsportaal.nl

[1] See for example p. 33 in http://www.eutro.org/documents/wfd%20cis2.4%20(coast)%20guidance%20on%20tcw.pdf

2 Changes since last COWI comparative assessment

2.1 Have there been significant changes in aspects and approaches described in ”Nabotjek af EU-landes fremgangsmåder ved planlægning for marine vandområdet i henhold til Vandrammedirektivet”, by COWI for Miljøstyrelsen (The Danish Environmental Agency) in 2018?

Following the 2017 EU Commission Decision on criteria and methodological standards on good environmental status of marine waters, which deems chlorophyl-a alone as a sufficient parameter for the quality element phytoplankton, the quality indicator algal bloom has been removed from all coastal water typologies and one transitional water typology.[2, 3]

The chlorophyl-a values for two coastal water typologies were adjusted to the results of the intercalibration exercise.[4] This resulted in a reduction in the reference values of i) coastal waterbodies that are strongly influenced by freshwater discharges, located near to and downstream from the outflows of the rivers Rhine, Meuse, and Ems, as well as ii) sheltered coastal waters influenced by discharges in the Rhine/Meuse delta and the Wadden Sea. Respectively, this led to a reduction from 9,3 µg/l to i) 7,5 µg/l for coastal waters of Rhine and Meuse and 4,5 µg/l for coastal waters of the Ems and ii) 6,4 µg/l for sheltered coastal waters and the Wadden sea. Despite a reduction of the reference condition, it has been considered to not reduce the target value. However, a conclusion on this matter is still outstanding.

[2] EC (2017). COMMISSION DECISION (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU

[3] STOWA, 2018, Referenties en maatlatten voor natuurlijke watertypen voor de Kaderrichtlijn Water 2021-2027

[4] STOWA, 2018, Referenties en maatlatten voor natuurlijke watertypen voor de Kaderrichtlijn Water 2021-2027

3 Reference for quality parameters in WFD

3.1 How is the reference condition for the quality parameters used in the country established? i.e. are historical measurements, modelling, or expert assessments used and at which point in time/year is used as reference for quality parameters in the WFD, in the case of historical measurements or modelling back to a historical point in time?

The overall approach to deriving nutrient-related reference conditions of the 2nd RBMPs generally also apply for the 3rd RBMPs. As mentioned above however, the reference conditions for two coastal water typologies were adjusted because of the intercalibration.

The phytoplankton biological quality indicators for coastal- and transitional waters consist only of chlorophyll-a concentrations. For lakes, chlorophyll-a concentrations and algal blooming of undesired phytoplankton taxa are used. For rivers, no phytoplankton-related parameters are applied. In the following, the approach for coastal and transitional waters as well as lakes is presented in more detail.

Coastal and transitional waters

For coastal and transitional waters, reference conditions for chlorophyll-a concentrations build on modelling (AMOEBE model), OSPAR values, expert judgement, and the EU intercalibration. The modelling uses 1930 as a reference year, as it was regarded illustrative for a situation with limited anthropogenic disturbance with simultaneous availability of historical data.[5] The concentrations of the reference year are partly derived from historic measurements, modelling, and expert judgement, owing to insufficient data on riverine nutrient loads and nutrient concentrations in the North Sea. The nutrient data in the North Sea was determined based on identifying the anthropogenic fraction of nutrient loads in the North Sea, and subsequently modelling the loads corresponding to the absence of an anthropogenic fraction.[6] The natural reference loads were assumed to correspond to 10-15% of riverine nutrient loads in 1987.

Resulting reference conditions are 9,3 µg/l (90th percentile) of chlorophyll-a for the coastal waters of Rhine and Meuse and the Wadden sea.[7] As mentioned above, the intercalibration led to a change of the reference conditions to i) 7,5

[5] Baptist, H.J.M. & E. Jagtman, 1997, Watersysteemverkenningen 1996. De AMOEBES van de zoute wateren.

[6] De Vries, I., F.J. Los, R. Jansen, S. Cramer & M. Van der Tol (1993). Risico-analyse eutrofiëring Noordzee RWS Dienst Getijdewateren

[7] STOWA, 2018, Referenties en maatlatten voor natuurlijke watertypen voor de Kaderrichtlijn Water 2021-2027

µg/l for coastal waters of Rhine and Meuse and 4,5 µg/l for coastal waters of the Ems and ii) 6,4 µg/l for sheltered coastal waters and the wadden sea. For coastal waters north of the Wadden sea and coastal waters of the Scheldt, a reference value of 6,7 µg/l (90th percentile) has been determined. For transitional waters, a reference value of 8,0 µg/l applies.

Freshwater lakes

For freshwater lakes, the reference conditions for chlorophyll-a concentrations build on a modelling of the empiric correlation between phosphorus background concentrations and water alkalinity and depth.[8] Eutrophication of Dutch lakes is primarily limited by phosphorus. The correlations build on a separate study that used reference lakes in Canada, Germany, and the USA. No reference year can be identified. Based on empiric correlations between phosphorus and chlorophyll-a, reference conditions were subsequently established for freshwater lakes. For brackish lakes, an expert judgement was used to determine the reference situation, as the above correlation is assessed to not valid for brackish lakes, owing to an unnatural water regime as a result from wide-spread land reclamation.

For freshwater lakes, resulting reference values of 3,84-7,4 µg/l (average concentration) have been determined for lakes. For brackish lakes, an "arbitrary" reference of 30 µg/l applies.[9] For the second phytoplankton quality indicator, algal blooming, it is not clear how the reference condition has been derived.[10]

[8] https://core.ac.uk/download/pdf/35112365.pdf

[9] Van den Berg & Rot (2007), Achtergronddocument referenties en maatlatten fytoplankton ten behoeve van de kaderrichtlijn water, p.13

[10] STOWA, 2018, Referenties en maatlatten voor natuurlijke watertypen voor de Kaderrichtlijn Water 2021-2027

Table 5: Quality parameters used and their reference condition method

Quality parameter	Establishment method for reference condition	Point in time/year as reference (if historical or modelling)	Comment
Chlorophyll-a – Coastal waters, Transitional waters	Historic, Modelling, Expert judgement	1930	
Chlorophyll-a – Freshwater lakes	Modelling	Not identified	Simplified modelling of empiric correlations
Chlorophyll-a – Brackish lakes	Expert judgement		

4 Status

4.1 How large part of the country's/region's water areas are in high, good, moderate, and poor condition, respectively?

None of the coastal waters have a good ecological status, as the table below presents. However, 90% of coastal waterbodies have a moderate status.[11] Taking all waters into account, none of the waterbodies have a good ecological status. However, nearly two thirds of the waterbodies have a moderate status as Table 6 shows.[12]

Table 6: Ecological status, Netherlands

	Coastal waters	All waters
High	-	-
Good	-	-
Moderate	8 (89%)	458 (62%)
Poor	1 (11%)	197 (27%)
Bad	-	78 (11%)

Source: Waterkwalitetsportaal.nl, table 4.oordelen_owl_2020_202101120954

The good ecological status is determined by biological quality elements (composed of phytoplankton, macrofauna, macrophytes, and fish (except for coastal waters)), general physico-chemical parameters (nutrients and others), and Environmental Quality Standards (EQS) for specific pollutants. A good ecological status requires that all three have a good status.[13]

The status of the biological indicators (i.e., phytoplankton, macrophytes, macrofauna, and fish) has improved over the course of the management periods. 32-53% of the waterbodies have biological parameters in a good

[11] The draft RBMPs do not provide a figure on the overall ecologic status assessment, but only an assessment of the underlying elements. However, the draft assessments are available on a separate data portal, based upon which the following status figures are provided

[12] The information of the two tables below have been extracted from a database, as the available documentation does not entail dedicated elaborations that are only focused on coastal waters. Accordingly, the contextual information that can be provided to these data is limited.

[13] The WFD CIS Guidance Document No. 13 (Overall Approach to the Classification of Ecological Status and Ecological Potential) elaborates further details of the status classification waterbodies. Figure 1 on p. 4 illustrates the role of all three indicators

status.[14] Furthermore, the state is good to moderate in 80-93% of the waterbodies. With regards to nutrient indicators, about 66% of waterbodies are reported to have a good status. [15]

Table 7 provides more detailed information on the status of the underlying quality elements of the ecological status of coastal waterbodies. Although none of the coastal waters have a good ecological status, most underlying biological quality elements have a good status. Due to the 'one-in-one-out' rule however, only a small share has a good status on the biological indicators. For the general physico-chemical parameters, which is composed of nutrients and other parameters, about half of the coastal waters have a good status. Finally, none of the coastal waters have a good status regarding specific pollutants, leading to an at most moderate ecological status classification of all coastal waterbodies.

[14] Ontwerp Stroomgebiedbeheerplannen 2022-2027, https://www.helpdeskwater.nl/onderwerpen/wetgeving-beleid/kaderrichtlijn-water/ontwerp-stroomgebiedbeheerplannen-2022-2027/

[15] Several excel files on the Dutch 'Water Quality Portal'; https://www.waterkwaliteitsportaal.nl/WKP.WebApplication/Beheer/Data/Publiek?viewName=Factsheets&year=2020&month=December

Table 7: Biological quality elements, general physico-chemical parameters, and specific pollutants underlying the Ecological Status of coastal waters, Netherlands

	Phytoplankton	Macrofauna	Macrophytes[1]	Nutrients	Other parameters	specific pollutants	
High	-	-	-	-	N/A	Good	-
Good	4 (44%)	6 (67%)	2 (50%)	4 (44%)			
Moderate	5 (56%)	3 (33%)	1 (25%)	5 (56%)		Failing to achieve good	9 (100%)
Poor	-	-	1 (25%)	-			
Bad	-	-	-	-			
	Biological quality elements[2]			Gen. Physico-chemical			
High	-			-			
Good	2 (22%)			4 (44%)			
Moderate	6 (67%)			5 (56%)			
Poor	1 (11%)			-			
Bad	-			-			
	Ecological Status[3]						
High	-						
Good	-						
Moderate	8 (89%)						
Poor	1 (11%)						
Bad	-						

Notes: '1' Macrophytes are only defined for one coastal water typology applicable to 4 coastal waterbodies.
'2' Consisting of the elements Phytoplankton, Macrofauna, and Macrophytes for coastal waters
'3' Consisting of Biological quality elements, general physico-chemical parameters, and specific pollutants
Source: Waterkwalitetsportaal.nl, table 4.oordelen_owl_2020_202101120954

4.2 What is the current status for implementing Water Plan 2 in the country?

The implementation of measures is reported to be generally on schedule. Despite substantial improvements of the status through the basic measures in the second management period, further improvements are necessary.[16] Such as additional purification of wastewater in some locations, and the fact that the 50

[16] Ontwerp Stroomgebiedbeheerplannen 2022-2027

mg/l limit for nitrates is being exceeded for groundwater bodies in sandy areas. As part of the targets for the chemical status, significant reductions have been achieved for chemical pollutants deriving from plant protection products, but are still lagging behind targets, requiring further efforts.[17]

The 2nd RBMPs entail a total of 230 measures, of which some are reported to be delayed as of 2020: 58% of the measures have been completed, 25% are under execution, and 17% are in the planning phase.[18] The supplementary measures address pressures related to i) water abstraction, ii) diffuse sources, and iii) the regulation of water movements and hydromorphology.

The measures addressing pressures from i) water abstraction focus mostly on the remediation of contaminated soil and groundwater bodies, reducing pressures from Wastewater Treatment Plants, leaky sewers, and other emission reduction measures. The measures addressing ii) diffuse pressures focus on nutrient and pesticide emissions from agriculture, emissions from traffic and shipping, and the removal of contaminated dredging material. Concerning iii) the regulation of water movements and hydromorphology, the measures mostly focus on widening, flattening, and naturalising wetlands and water courses, as well as active vegetation and water quality management.

The upstream nutrient emissions in neighbouring countries, particularly in case of the Meuse and Rhine, have a dominating influence on the nutrient status of the Dutch waters, including its coastal waters.[19] The nitrogen and phosphorus loads entering Dutch waters from upstream rivers roughly correspond to the same load entering the offshore sea. The upstream nutrient loads from the Rhine and (to a lesser extent) the Meuse have however decreased considerably over the past decades.

This is mainly the result of improved wastewater treatment and reduced industrial emissions from abroad.[20] The average phosphorus concentrations in the Rhine are below target and the nitrogen concentrations close to the target. In case of the Meuse, the nitrogen and phosphorus concentrations are falling but are still above target. The loads entering coastal waters arehowever still too high to meet the standards in the North Sea, Wadden Sea and Ems-Dollard.

The Dutch RBMPs and its underlying analyses generally do not entail an isolated focus on coastal waterbodies, but rather a focus across all types of waterbodies. Information that is focused on coastal waters is therefore limitedly available. This is also somewhat consistent with the Dutch approach towards the WFD of focussing its nutrient efforts on inland waterbodies, as for example the nutrient

[17] The Dutch RBMPs also address substances beyond the

[18] Rijkswaterstaat, 2021, Jaarrapportage ecologische waterkwaliteit en natuur 2020: Kaderrichtlijn Water, Natura 2000 & Programmatisch Aanpak Grote Wateren

[19] Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

[20] Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

concentrations of coastal waterbodies are dominated by the nutrient loads from upstream neighbouring countries.

5 Water Plan 3 contents

5.1 Are efforts planned on other pressure factors than nutrients in Water Plan 3?

The 3rd RBMPs address all types of significant pressures, with a wide combination of measures that focus on ecologically optimal management, setup, and maintenance of water systems, emissions reduction, and laws and regulations, consisting of 120 measures. [21, 22, 23]

Nutrient pressures from agriculture and atmospheric deposition are the dominant pressures across all four river basin units (RBU), applying to respectively 594 and 366 waterbodies (or 80% and 49%). Wastewater treatment plants are a third, large source of nutrients. These do however exert a significant pressure to only 121 waterbodies (or 16%).

Physical and hydrological modifications in the form of e.g. canals, dams, dikes, groynes, and weirs are a further pressure affecting the waterbodies. In the case of artificial and heavily modified waterbodies, most of these modifications were for the purposes of flood protection, agriculture, and transport.

The RBMPs also focus on chemical substances exerting pressures to waterbodies, which entail priority substances under the Environmental Quality Standards Directive as well as substances expected to become a priority substance.[24]

[21] Clarification by Ministry of Infrastructure and Water Management

[22] Ontwerp Stroomgebiedbeheerplannen 2022-2027

[23] Rijkswaterstaat, 2021, Jaarrapportage ecologische waterkwaliteit en natuur 2020: Kaderrichtlijn Water, Natura 2000 & Programmatisch Aanpak Grote Wateren

[24] (EQS) Directive 2008/105/EC

Table 8: Pressure factors identified in water plans, Netherlands. Parentheses indicate that only a small fraction of waterbodies is affected.

		Rhine	Meuse	Scheldt	Ems	Netherlands	Actions planned
Point sources	Industry	(Significant)	(Significant)	Not relevant	Not relevant	(Significant)	Not identified
	Treatment plants	Significant	Significant	Significant	Significant	Significant	Yes
	Aquaculture	Not specified	Not specified	Not specified	Not specified	Not specified	Not identified
Diffuse sources	Scattered settlements	(Significant)	Not relevant	Not relevant	Not relevant	(Significant)	Yes
	Agriculture	Significant	Significant	Significant	Significant	Significant	Yes
	Rain-related outlets	Significant	(Significant)	Not relevant	Not relevant	Significant	Yes
	Airborne deposits	Significant	(Significant)	(Significant)	Significant	Significant	Yes
	Other diffuse sources	Significant	Significant	Significant	Significant	Significant	Yes
Physical impacts	Water extraction	(Significant)	(Significant)	Not relevant	Not relevant	(Significant)	Yes
	Physical modification	Significant	Significant	Significant	Significant	Significant	Yes
Other	Invasive species	Significant	(Significant)	(Significant)	(Significant)	Significant	Yes
	Fisheries	Not specified	Not specified	Not specified	Not specified	Not specified	Not identified
	Acidification	Not specified	Not specified	Not specified	Not specified	Not specified	Not identified
	Other	Significant	(Significant)	(Significant)	Not relevant	Significant	Yes

Source: Ontwerp Stroomgebiedbeheerplannen 2022-2027; Clarification by Ministry of Infrastructure and Water Management

Table 9 below presents the significant pressures identified for coastal waterbodies. It can be seen that diffuse nutrient sources other than agriculture, atmospheric deposition, wastewater, or rain-related outlets exert a significant pressure on all coastal waterbodies. Furthermore, dams, physical modifications other than for agriculture, transport, shipping, and flood protection, and invasive species exert a significant pressure on some coastal waterbodies. The draft RBMPs and their underlying analyses do not provide further contextual information on the pressures specifically relating to coastal waters.

Table 9: Significant pressures in coastal waters, Netherlands

	Coastal waters
Dams	3 (33%)
Other physical modifications	1 (11%)
Invasive species	4 (44%)
Other diffuse nutrient sources	9 (100%)

Source: Waterkwalitetsportaal.nl, 2_belastingen_significant_owl_202101141408_SGBP3

5.2 Have exemptions from the WFD been used in Water Plan 3 – which and to which extent?

The Dutch RBMPs widely apply exemptions until 2027. For waterbodies with exemptions due to disproportionate costs (article 4.4b of the WFD) and technical feasibility (article 4.4a), it is expected that the targets will be achieved. For waterbodies with an exemption due to natural circumstances (article 4.4c), it is expected that the targets will be achieved after 2027. To the extent that waters with the above exemptions will not be able to meet the 2027 target, the Dutch authorities may also apply an exemption for a target reduction (article 4.5).[25] Table 10 presents the different types of exemptions applied until 2027 for coastal waters and all waterbodies.

[25] Clarification by Ministry of Infrastructure and Water Management

Table 10: Exemptions applied until 2027 on coastal waters (excl. Territorial waters) and all waterbodies (incl. territorial waters), Netherlands

Art.	Description	Coastal waters (excl. territorial)	All waterbodies (incl. territorial)
4.4a	Technical feasibility	1 (11%)	618 (83%)
4.4b	Disproportionate costs	9 (100%)	311 (42%)
4.4c	Natural circumstances	8 (89%)	591 (79%)
4.6a	Natural circumstances	-	106 (14%)
4.6b	Accidents	-	3 (>0%)
4.6c	Force Majeure	-	5 (1%)
4.7a	New sustainable human development	-	1 (>0%)
4.7b	New modifications to the physical characteristics	-	1 (>0%)

Source: Waterkwalitetsportaal.nl; Ontwerp Stroomgebiedbeheerplannen 2022-2027, Table 2-a

Exemptions until the 2027 deadline (i.e. article 4.4) are widely applied for the RBUs Rhine, Meuse, and Ems. For Meuse and Ems, exemptions are applied to all waterbodies but one.[26] In case of the Rhine, exemptions are applied to 85% of the waterbodies. Finally, only a limited number of exemptions are applied in the Scheldt RBU, with 25% of waterbodies.[27] Natural causes, disproportionate costs, and technical feasibility are provided as the cause for these exemptions. In terms of exemptions for coastal waters, Table 10 shows that eight coastal waterbodies have an exemption due to natural circumstances (article.4.4c). There is thus a risk for nearly all coastal waterbodies that the environmental target will not be reached. As elaborated above, the Dutch authority may therefore apply exemptions for a reduced target setting (article 4.5). Exemptions due to technical feasibility (article 4.4a) are applied to one, and disproportional costs (article 4.4b) to all coastal waterbodies.

Furthermore, derogations for a temporary deterioration of the environmental objectives (i.e. article 4.6 of the WFD) are applied for about 13% of waterbodies in the RBU Rhine and about two-thirds of waterbodies in the RBU Scheldt, with natural conditions as the primary cause.[28] However this exemption is not applied to coastal waterbodies.

[26] Ontwerp Stroomgebiedbeheerplannen 2022-2027

[27] The Ministry of Infrastructure and Water Management has clarified that these figures may still be subject to changes, as the work on the environmental objective setting was on-going during the drafting of the RBMPs

[28] Ontwerp Stroomgebiedbeheerplannen 2022-2027

Finally, two exemptions on the environmental objectives have been applied to non-coastal waterbodies as a result of new modifications (i.e. article 4.7 of the WFD), as presented in Table 10.

5.3 What are the targets for nitrogen and phosphorus in Water Plan 3? How large reductions (in tons and %) are necessary, and are there concrete targets such as concentration in river waters by estuary?

The nutrient loads from national origin have been on a decreasing trend since 1990, as well as the beginning of the 1st management period in 2009, albeit a small increase in 2015, which can be mainly traced back to a reduction in loads being washed out from agricultural soils. Figure 3 below presents the trend of the national nutrient loads in more detail, where it is evident that diffuse nutrient discharges in rural regions are the largest source. Foreign upstream nutrient loads, which are not included in the figure below, exert however a higher pressure than the national nutrient loads. Most of that load goes from the border to the sea and mainly affects the large rivers, lower rivers, the Lake Ijssel, and coastal waters.[29]

[29] Ontwerp Stroomgebiedbeheerplannen 2022-2027

Legend:

Rural diffuse nutrient discharges

Direct agriculture

Wastewater effluent

Rain & sewage water

Industry

Atmospheric deposition

Other

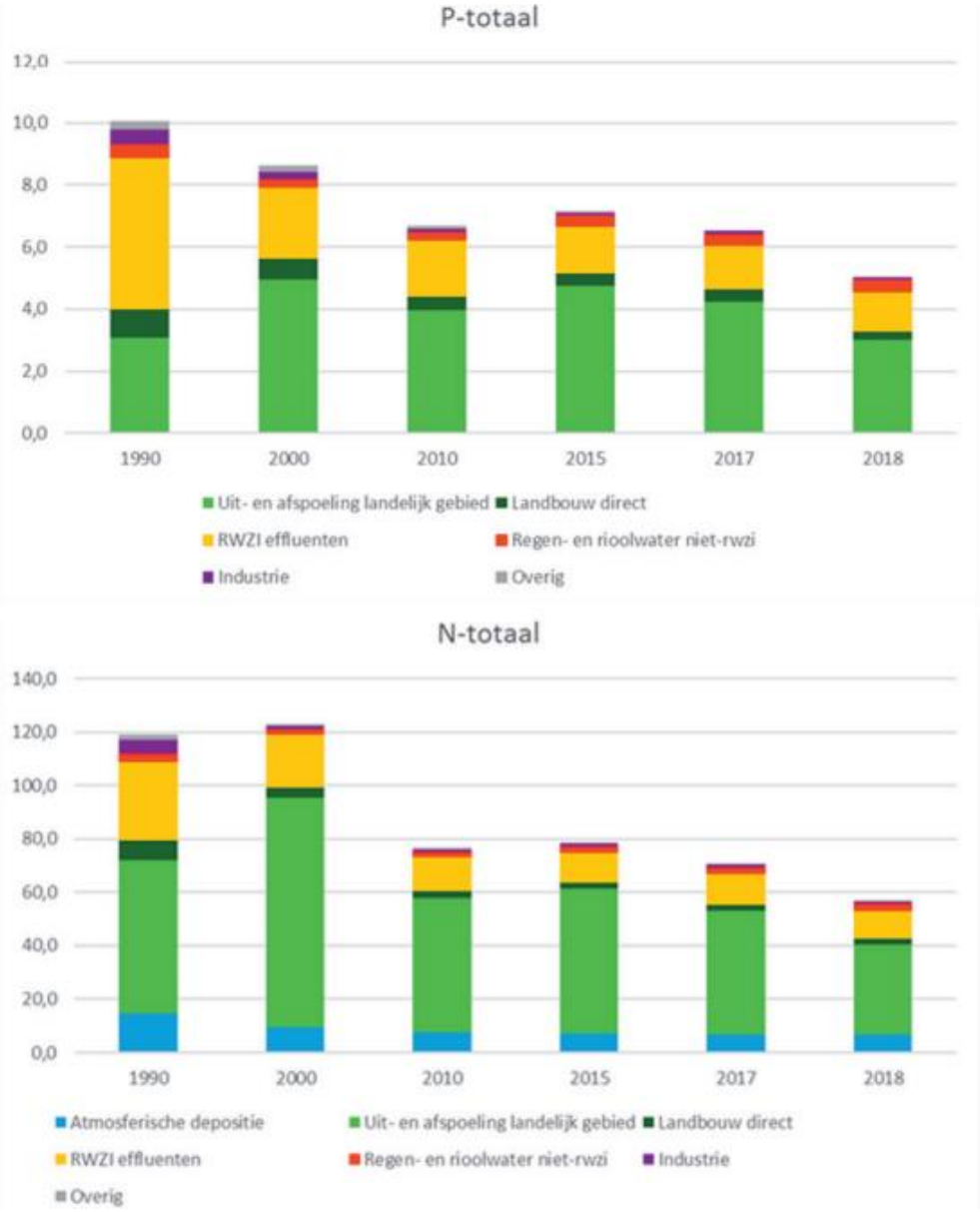

Figure 3: Trend of total phosphorus (TP) and total nitrogen (TN) loads in the Netherlands, excluding foreign loads (in 1,000 ton). Source: Ontwerp Stroomgebiedbeheerplannen 2022-2027, s. 47

The upstream nutrient loads lead in some cases to high exceedances of local target concentrations, making the fulfilment of the 2027 environmental objective uncertain for 27 waterbodies.

The Dutch RBMPs have specified norms for nitrogen and phosphorus for waterbodies, which are presented in Table 11.[30] For all river and most lake typologies, phosphorus is the growth-limiting nutrient, and thereby the binding norm. For all coastal, transitional, territorial, and some lake typologies in turn, nitrogen is the binding norm as it constitutes the growth-limiting nutrient. The

[30] Annex 12 in STOWA, 2018, Referenties en maatlatten voor natuurlijke watertypen voor de Kaderrichtlijn Water 2021-2027STOWA, 2018, Referenties en maatlatten voor natuurlijke watertypen voor de Kaderrichtlijn Water 2021-2027

norm for the other nutrient may however neither be exceeded if it endangers the target for other waterbodies. The 3rd RBMPs do not entail any changes to the methodology of the physico-chemical parameters of nitrogen and phosphorus and its target values.

For the Rhine, Meuse, and Ems, a nitrogen target of 2,5 mg N/l of the summer concentrations in the estuaries are in place. For the Rhine and Ems, these have also been internationally agreed[31,32]. For the Scheldt, no such agreement is in place – apart from the nutrient norms defined for related water typologies. In the case of the Rhine, the target concentrations are largely met. Despite important steps taken in the nutrient loads of the estuaries of the Meuse, Scheldt and Ems, the target values have not been achieved yet. All coastal waterbodies have the same nitrogen target of 0,46 mg Dissolved Inorganic Nitrigen (DIN) per liter in the winter period, irrespective of their typologies. All transitional waters and territorial waters have the same target. It was not possible to identify the reductions required for coastal waters.

The nitrogen targets for lakes and rivers are respectively 0,9-2,0 mg N/l and 2,3-2,5 mg N/l, requiring a median reduction of up to 69%. For phosphorus, the targets for lakes and rivers are respectively 0,03-0,11 mg P/l and 0,11-0,14 mg P/l, requiring a median reduction of up 87%.

Taking account of all types of waterbodies, about 50% comply with either the defined nitrogen or phosphorus norm (based average measurements in 2016-2018).[33] For the national waterbodies where exceedances of the norms are identified, the median exceedances are respectively 2,0 mg N/l and 0,2 mg P/l. The exceedances are notably high for waterbodies that are directly part of international river systems. For nitrogen in the Scheldt, the average exceedance is 75% over the norm, while it is close to target for the other major systems. In the case of phosphorus, high exceedances are found in the Rhine and Ems, with average values in catchments exceeding the target by up to 125%.

Table 11: Targets for nitrogen and phosphorus in Water Plan 3 and reductions necessary

Nutrient	Target	Reductions necessary to reach good ecological status
Nitrogen – Estuaries of Rhine, Meuse & Ems	2,5 mg N/l (summer average)	*Not available*

[31] This corresponds to a 2,8 mg N/l target of the year average, as also applied for German coastal waters in the North Sea

[32] Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

[33] Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

Nitrogen – Coastal water, transitional water, territorial water	0,46 mg DIN/l (winter average)	*Not available*
Nitrogen – Lakes	0,9 – 2,0 mg N/l (summer average)	Median reduction of 2,0 mg N/l (50-69%)
Nitrogen – Rivers	2,3 – 2,5 mg N/l (summer average)	Median reduction of 2,0 mg N/l (44-47%)
Phosphorus - Lakes	0,03 – 0,11 mg P/l (summer average)	Median reduction of 0,2 mg P/l (65-87%)
Phosphorus - Rivers	0,11 – 0,14 mg P/l (summer average)	Median reduction of 0,2 mg P/l (59-65%)

Source: STOWA 2018-49 Maatlatten defdef.pdf

5.4 Do the countries have efforts in Water Plan 3 that are expected to lead to achieving good ecological condition and is there an implementation plan for the efforts?

All measures have been decided and are assessed to close the identified gaps. Some of the agricultural measures are however still subject to discussions as part of the update of the Dutch Nitrate Action Programme (as further presented below). Furthermore, some upstream countries are reported to postpone their measures beyond 2027, which may impact the status of Dutch waterbodies in 2027.[34]

Finally, the lag of the response to measures, climate change, as well as the diffuse, transboundary, and/or persistent character of some pollutants may lead to continued exceedances of the targets by 2027.[35] The involved parties have therefore agreed to take a decision on potentially additional measures until 2027, if there is a risk that targets will not be met. The Dutch authorities

[34] Clarification by Ministry of Infrastructure and Water Management

[35] Ontwerp Stroomgebiedbeheerplannen 2022-2027 & Clarification by Ministry of Infrastructure and Water Management

anticipate nevertheless that further management periods will be necessary after 2027.[36]

Table 12 presents the estimated compliance of waterbodies with the individual quality elements of the ecological status. Further differentiation is made among regional and national waterbodies, which denote waterbodies managed respectively by regional water boards and the national government. All coastal waterbodies and other major waterbodies like the Rhine are managed as national waterbodies. Coastal water-specific data could not be identified.

The foreseen measures are expected to lead to a reduction in nutrient pressures. Concretely, specified, national, measures in wastewater treatment and limited local measures in agriculture are expected to reduce nutrient pressures by more than 10-15% in regional waters.[37] This is anticipated to result in 60% of regional waterbodies achieving the target concentrations for both nitrogen and phosphorus in 2027 - and up to 75% that achieve at least either target in the regional waterbodies.[38]

For national waterbodies, about 70% of waterbodies are expected to achieve their phosphorus targets, and only 45% of waterbodies their nitrogen targets. It should be noted that only nitrogen is relevant for the status assessment of coastal waters.

Further improvements in the target concentrations depend on the development of the Dutch Nitrate Action Programme (which is due to be revised in 2021), and the extent to which the sector participates in locally tailored measures, the level of enforcement, and the degree of international coordination/cooperation.[39] Provided that all farmers implement locally tailored measures, it is expected that up to 85% of regional waterbodies will achieve their nutrient targets.

As regards the update of the Nitrate Action Programme, an Environmental Impact Assessment of the draft programme has concluded that it would not meet the environmental objectives of the Nitrates Directive or WFD.[40] As the political discussions are however still on-going, it is premature to make definite conclusions on the effectiveness of the programme.

The measures that are planned for national waterbodies are expected to lead to a good status in virtually all waterbodies and for all biological indicators. This stands in stark contrast to regional waterbodies, where the biological targets will be achieved for 30-60% of waterbodies. As for nutrients above, the potential

[36] Clarification by Ministry of Infrastructure and Water Management

[37] Ontwerp Stroomgebiedbeheerplannen 2022-2027

[38] Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

[39] Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

[40] https://www.tweedekamer.nl/kamerstukken/brieven_regering/detail?id=2021Z14999&did=2021D32106

effects of the upcoming revision of the Dutch Nitrate Action Programme is not accounted for.

Despite the expectation that approximately all national waterbodies will achieve a good status on the biological indicators, only 45% of national waterbodies will achieve a good status on nitrogen. As regards to coastal waters, as also shown above on the exemptions, it is expected that no coastal waters will achieve a good status by 2027. It has not been possible to identify when these waters will achieve a good status.

Table 12: Approximate share of waterbodies with a good status in 2027, by regional and national waterbodies, and biological indicator. All coastal waterbodies (and other major waterbodies) are in the "national waterbody" category. Of the nutrient parameters, only nitrogen applies to coastal waterbodies.

Quality Element		Regional waterbodies	National waterbodies
Physico-chemical	Nitrogen	60%	45%
	Phosphorus	60%	70%
Biological	Fish	40%	100%
	Macrophytes	30%	100%
	Macrofauna	40%	100%
	Phytoplankton	60%	100%

Source: Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

The 3rd RBMPs entail a detailed summary of the planned basic and supplementary measures, per overall pressure category. Where applicable, area-specific measures are also allocated to individual waterbodies. However, no drafts of the specific Programme of Measures for each RBU have been published and are only summarised as part of the draft for the 3rd RBMP, and its underpinning analyses.

As described above, measures on manure policy and wastewater treatment plants are anticipated to lead to the largest improvements in terms of nutrient pressures. In light of the recent exceedances of nitrate limits in groundwaters, the upcoming revision of the Dutch manure policy through its seventh Nitrate Action Programme, may lead to substantial, additional, reductions of nutrient pressures.

The types of foreseen measures that target nutrient-pressures include the following:[41]

- precision fertilization,
- a wider application of catch crops,
- increasing the nitrogen effect of animal manure,
- purification of drain water,
- the construction of thresholds in ridge crops, and
  use of buffer strips.

As also elaborated above, the lag of the response to measures as well as the diffuse, transboundary, and/or persistent character of some pollutants, may lead to some exceedances of the targets in 2027, and the possible introduction of further measures

[41] Van Gaalen et al., 2020, Nationale Analyse Waterkwaliteit - Onderdeel van de Delta-aanpak Waterkwaliteit

6 Regulation of fertilizer storage and application

6.1 Which rules apply regarding fertilizer use? Specifically: Are there norms/quotas for nitrogen and phosphorus application? Which ones?

The Netherlands has a nitrogen norm in place based on crop, soil, and season of the year.[42] These norms are centrally defined for a three-year period and will be updated for 2021.[43] Additionally, a general quota for manure of 170 kg/ha/yr is applicable. The Netherlands has been granted a derogation of 230-250 kg/ha/yr under the Nitrates Directive for limited areas in 2020 and 2021.[44] It is however unclear whether the derogation for the Netherlands will be renewed, as the nitrate concentrations have been increasing since 2017 and partially exceeding the Directive's limit of 50 mg/l.[45]

The nitrogen norms are updated in a three-year interval as part of the update of the Dutch Nitrate Action Programme. The next (i.e. the seventh) Nitrate Action Programme is due in 2021, and it will possibly further lower the current norms from 2022 onwards.

For phosphorus, a limit is in place of 40 and 75 kg phosphate/ha/yr on arable land and grasslands, respectively. The phosphate norms were recently lowered for phosphate-rich soils, and is anticipated to lead to a reduction of phosphate in these soils by 0.5 %/yr.[46]

The Netherlands further has quotas in place for dairy cattle and pigs. A phosphate quota for dairy cattle was introduced in 2018.[47] Based on excretion norms and the number of livestock units held in 2015, phosphate quotas have been allocated. Farmers are subject to a reduction of these quotas. It is possible to trade quotas, however at a fee of 20% of the volume.

[42] RVO, 2021, Agrarisch Ondernemen, Mest, https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest, Accessed: August 2021

[43] The norms can be accessed at https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest/gebruiken-en-uitrijden/hoeveel-stikstof-landbouwgrond

[44] RVO, 2021, Agrarisch Ondernemen, Mest, https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest, Accessed: August 2021

[45] https://www.nieuweoogst.nl/nieuws/2021/04/14/nieuwe-derogatie-lang-niet-vanzelfsprekend

[46] Ontwerp Stroomgebiedbeheerplannen 2022-2027

[47] RVO, 2021, Agrarisch Ondernemen, Mest, https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest, Accessed: August 2021

For pigs, a quota is applicable to the number of pig-units that can be held.[48] The quotas can be traded, but restrictions apply to areas with a high concentration of pigs.

At last, a manure processing requirement is applicable for livestock producers with a surplus of phosphorus production beyond the applicable quotas for dairy cattle and pigs. A share of that surplus must be processed (e.g. incorporated into the field or be exported/sold to a third party). The share alternates between 10%, 52% and 59% for 2021, depending on the livestock production concentration in the region.[49]

Table 13: Nutrient norms

Nutrient	Quota / Norm	Comment
Nitrogen	Norm: Crop and soil-specific norm, max. 385 kg N/ha/yr. Quota: 170 kg organic N/ha/yr; Derogations of 230 & 250 kg organic N/ha/yr.	Norms subject to update in 2021. Derogations for manure quotas subject to renewal
Phosphorus	Norm: 40 kg phosphate/ha/yr on arable land; 75 kg phosphate/ha/yr on grassland.	*As above*

Source: RVO, 2021, Agrarisch Ondernemen, Mest

6.2 Are there requirements to equipment for storing and applying livestock manure? Which ones?

Storage and application requirements for manure are applicable. In terms of storage, sufficient storage is required for seven months of manure production associated with the maximum capacity. The manure production per unit is pre-determined by standard values. Derogations apply, provided that manure is disposed or applied, that the number of animals is lower than the permit, or that animals spend most of the fall/winter period outside.

The restrictions to application equipment for manure alternate by manure, land use, and soil type. The applicable restrictions are referred to low-emission use of manure.

For grasslands with clay and peat soil, liquid manure may only be applied into the ground (with injectors into trenches that are fully closed or into potholes). On-the-ground application is only allowed with water-diluted manure. For grasslands with sand and loess soils, only into-the-ground application with a

[48] RVO, 2021, Agrarisch Ondernemen, Mest, https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest, Accessed: August 2021

[49] RVO, 2021, Agrarisch Ondernemen, Mest, https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest, Accessed: August 2021

closed injector system is permitted. The application of solid manure on grassland is not subject to restrictions.

For arable land, liquid manure must be applied into the ground with a closed system. On-the-ground application is also permitted, if manure is worked into the ground in the same pass, with one machine. The application of solid manure requires low emission use, in which the manure is incorporated within two immediate working passes.

6.3 Are there requirements in terms of point in time for storing and applying livestock manure? Which ones?

Restrictions in relation to the application period and soil conditions apply. The time restrictions for the application of manure vary by liquid- and solid manure, soil type, and land use.[50] These are presented in Table 14below. There are further derogations that are applicable:

- Solid manure, that is rich in hay, on clay and peat grasslands can be applied from 1st December until 15th September,
- Liquid manure application on arable land after 1st August must be followed by the sowing of either green manure or winter rapeseed as catch crops after 15th September,
- Liquid manure for maize on sandy and loess soil is only permitted from 15th March, and
- Solid manure application for fruit and vegetable trees on sandy and loess soils is permitted all-year round.

As mentioned above, these requirements may be subject to change in the upcoming seventh Nitrate Action Programme due in 2021.

Table 14: Time periods for the application of manure

Land use	Soil	Liquid manure	Solid manure
Grassland	Sand, Loess	16.10. – 31.08.	01.02. – 31.08.
	Clay, Peat		01.02. -15.09.
Arable land	Sand, Loess	16.02. – 15.09.	01.02. – 31.08.
	Clay, Peat		All-year

[50] RVO, 2021, Agrarisch Ondernemen, Mest, https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest, Accessed: August 2021

Further restrictions relate to suitable soil conditions, and are summarised as follows:[51]

- (Partly) frozen or snow-covered ground, with the exception of solid manure on grassland,
- Soils with a water saturated topsoil layer,
- Soils that are irrigated between 1st September and 31st January,
- Uncultivated land with a slope of 7% or more,
- Animal manure application must be followed by sowing a crop within 8 days of use. Additional conditions apply for maize, potatoes and beets,
- cultivated or uncultivated land with a slope of 7% or more and affected by trench erosion,
- arable land with a slope of 18% or more.

[51] RVO, 2021, Agrarisch Ondernemen, Mest, https://www.rvo.nl/onderwerpen/agrarisch-ondernemen/mest, Accessed: August 2021

7 Pressure factors from other regions

7.1 How are pressure factors dealt with, e.g. nutrient supply and non-natural substances, from other countries/regions?

For all four RBUs, the Netherlands coordinates the implementation of the WFD in respective international committees. Among others, the committees are used to agree on specific measures. In the Rhine catchment for example, a 30% reduction of micropollutant emissions was agreed in the coming years. Other examples are agreements on facilitating upstream fish migration, or the coordination of the upgrading of upstream wastewater treatment plants.[52]

It is however clear that the nutrient pressures from the upstream regions lead to high nutrient levels of waterbodies at the border, of which particularly Rhine and Meuse, making the achievement of a good status for these uncertain.[53] The effluent of the Rhine is also almost exclusively transported towards the north, further impacting German coastal waterbodies. For the Ems and Rhine (which enter the Netherlands through Germany), the nitrogen target at the estuary is therefore internationally agreed.

In the case of the Meuse or Scheldt, no internationally agreed target could be identified for estuaries or coastal waters. As however elaborated above, the Netherlands actively coordinates the measures with upstream neighbours.

[52] Clarification by Ministry of Infrastructure and Water Management

[53] Ontwerp Stroomgebiedbeheerplannen 2022-2027, e.g. Table 4-a

8 Other information

N/A

9 Summarized findings

Table 15: Summary table, coastal waters, the Netherlands

	Subject / Question	The Netherlands
2	***Changes since last COWI neighbor assessment***	
2.1	*Have there been significant changes in aspects and approaches described in Vandrammedirektivet.pdf (mst.dk)?*	Yes, the reference values for chlorophyll-a have been adjusted to the intercalibration. Further, the quality indicator 'algal bloom' has been dropped for coastal waters and one transitional type.
3	***Reference for quality parameters in WFD***	
3.1	*Methodology for establishing reference condition for quality parameters?*	Chlorophyl-a, Historic/Modelling/Expert
3.2	*Point in time*	1930
4	***Status***	
4.1	*Coastal water areas in high, good, moderate, and poor condition*	0% high/good, 89% moderate, 1% poor, 0% bad
4.2	*Status for implementing Water Plan 2 and Water plan 3*	WP 2: 58% of the measures have been completed, 25% are under execution, and 17% are in the planning phase. WP 3 is under public consultation
5	***Water Plan 3 contents***	
5.1	*Efforts planned on other pressure factors than nutrients in WP3?*	Yes
5.2	*Exemptions from the WFD used in WP3? And is there a "Plan B", e.g. preparations for a potential 4th plan period or for seeking exemptions to larger degrees?*	Yes A 4th period is expected; Exemptions will be reviewed by 2027
5.3	*WP3 target, nitrogen (ton, %)*	0,46 mg DIN/l in coastal waters; 2,5 mg N/l in estuary; 0,9-2,5 mg N/l in lakes/rivers
5.3	*WP3 target, phosphorus (ton, %)*	no target for coastal waters; 0,03-0,14 mg P/l in rivers/lakes
5.3	*Reductions necessary to reach targets, nitrogen? (ton, %)*	n/a for coastal waters or estuary; 2,0 mg N/l in lakes/rivers (median)
5.3	*Reductions necessary to reach targets, phosphorus? (ton, %)*	0,2 mg P/l (median)

5.3	*Concrete targets, e.g. concentration in estuaries, nitrogen?*	Yes
5.3	*Concrete targets, e.g. concentration in estuaries, phosphorus?*	Yes
5.4	*Efforts in WP3 expected to lead to good ecological condition?*	Yes, but not all
5.5	*Implementation plan for efforts in WP3?*	Yes
6	***Regulation of fertilizer storage and application***	
6.1	*Norms/quotas for nitrogen application?* *Which ones?*	Norm, crop-, soil- specific; Organic 170 kg/ha/yr quota
6.1	*Norms/quotas for phosphorus application?* *Which ones?*	Norm, 40/75 kg Phosphate/ha/yr on arable-/grassland
6.2	*Requirements to equipment for storing and applying livestock manure?* *Which ones?*	Yes. 7-month capacity. Manure-, soil-specific restrictions
6.3	*Requirements in terms of point in time for storing and applying livestock manure?* *Which ones?*	Yes. Time- and soil-conditioned restrictions.
7	***Pressure factors from other regions***	
7.1	*How are pressure factors dealt with, e.g. nutrient supply and non-natural substances, from other countries/regions?*	Coordination occurs, but unclear how upstream pressures are dealt with

Table 16: List of interviewees

Country	Name	Organisation
Netherlands	Not available	Directorate-General Water & Soil, Ministry of Infrastructure and Water management (clarification of questions and provision of global comments)