Interreg North-West Europe
Co-funded by the European Union

Rural Roadwater Rescue

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Legal Boundaries for Roadwater Quality

Final conference
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Scope & why

- Scope: Investigating **the legal boundaries for road water use** within the RRR network (Flanders, Netherlands, Germany and France)
- Why?

Avoid pollution to our rivers and nature areas

Protect our drinking water wells

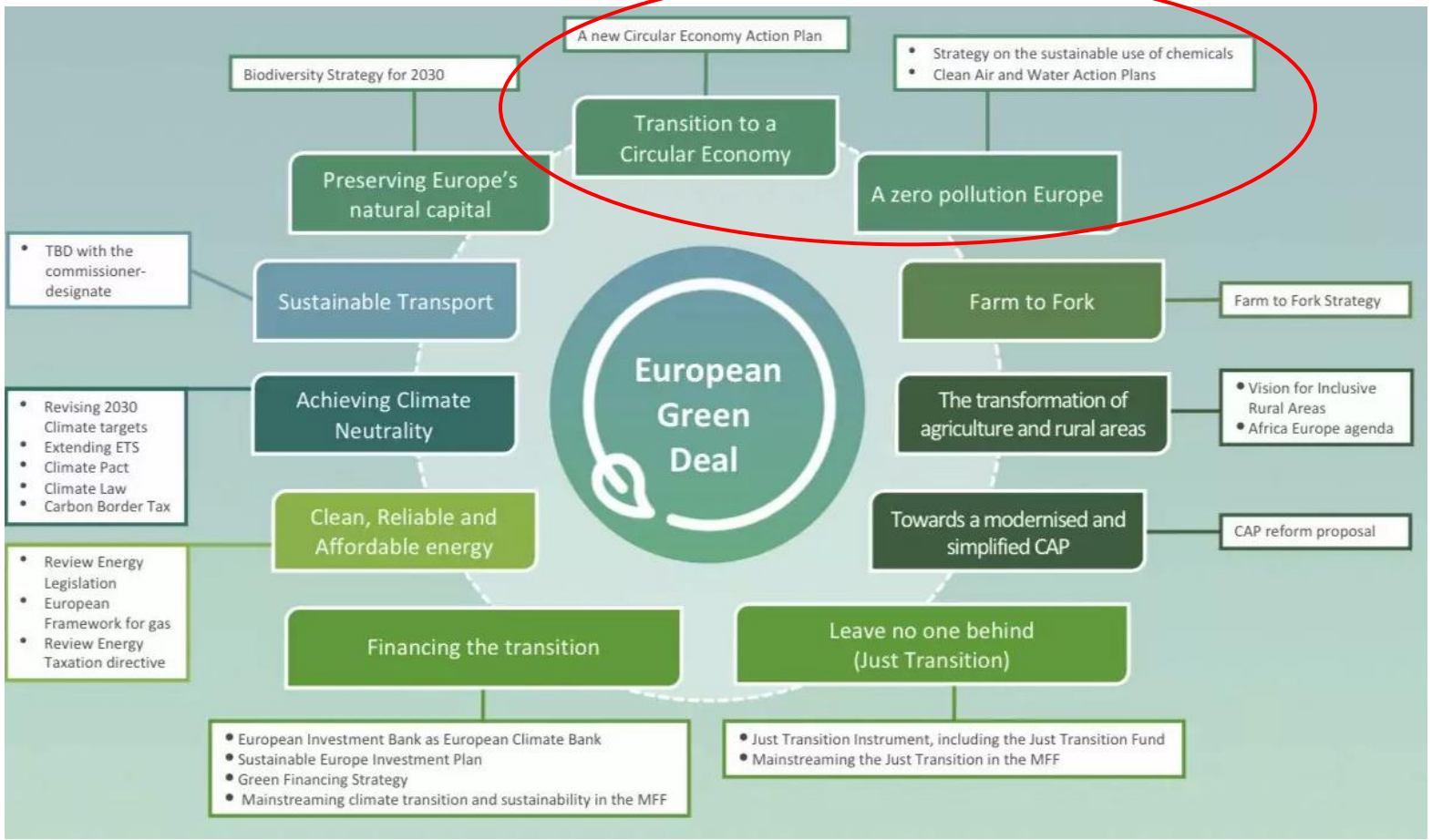
Battle water scarcity

Scope & why

- Scope: Investigating **the legal boundaries for road water use** within the RRR network (Flanders, Netherlands, Germany and France)
- Why?

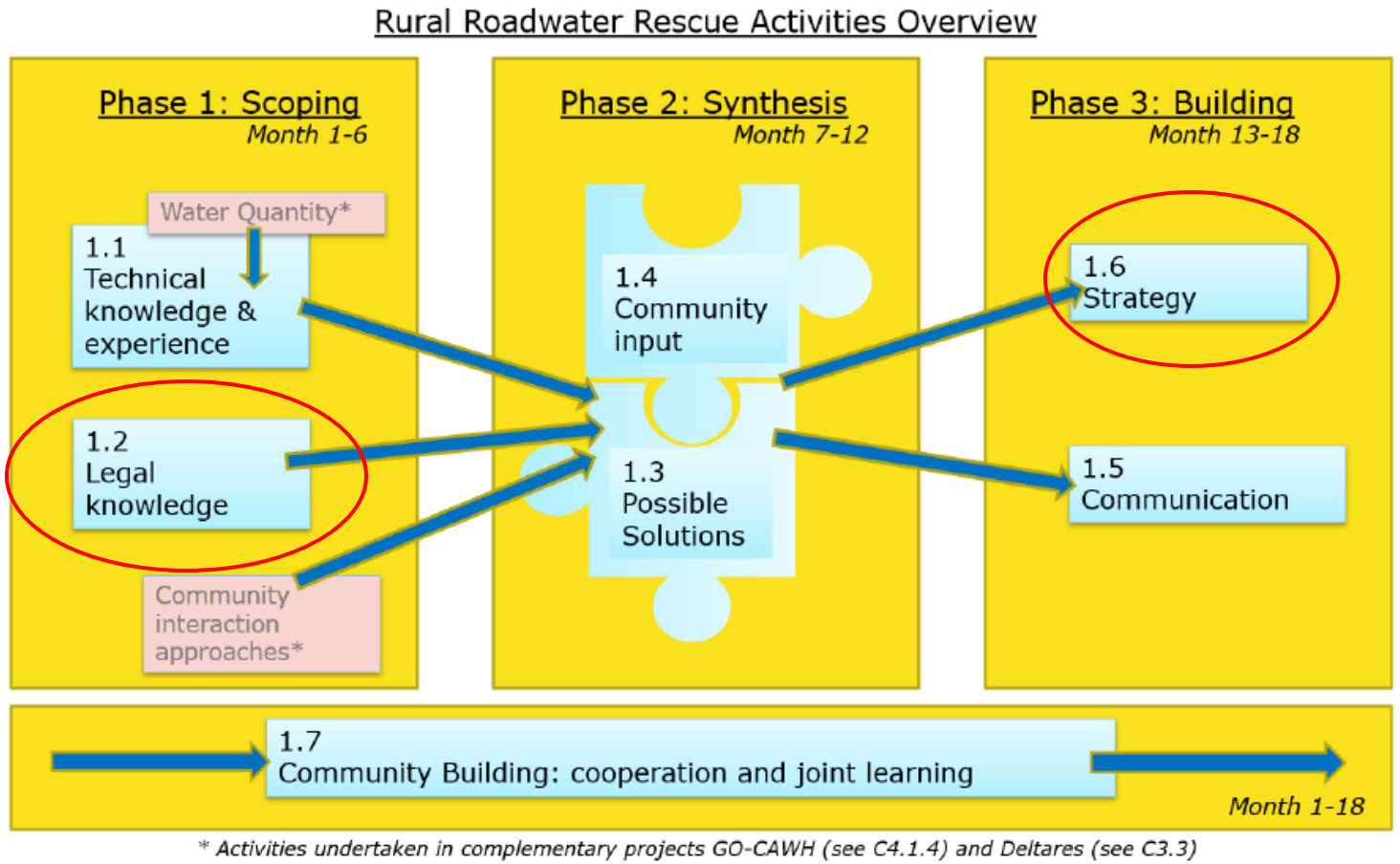
& sometimes too much

Scope & why

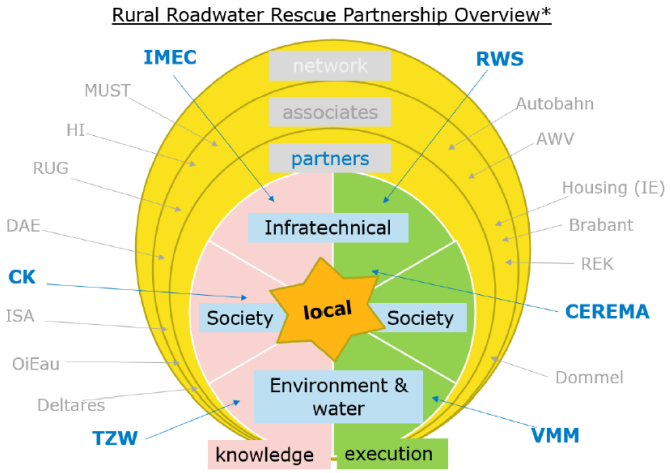


- **Zero pollution** objectives
- Building **a water-smart circular economy**
- Anticipate water-related climate risks
- Support disruptive research & innovation activities
- Leverage digital water opportunities

Our activity within RRR

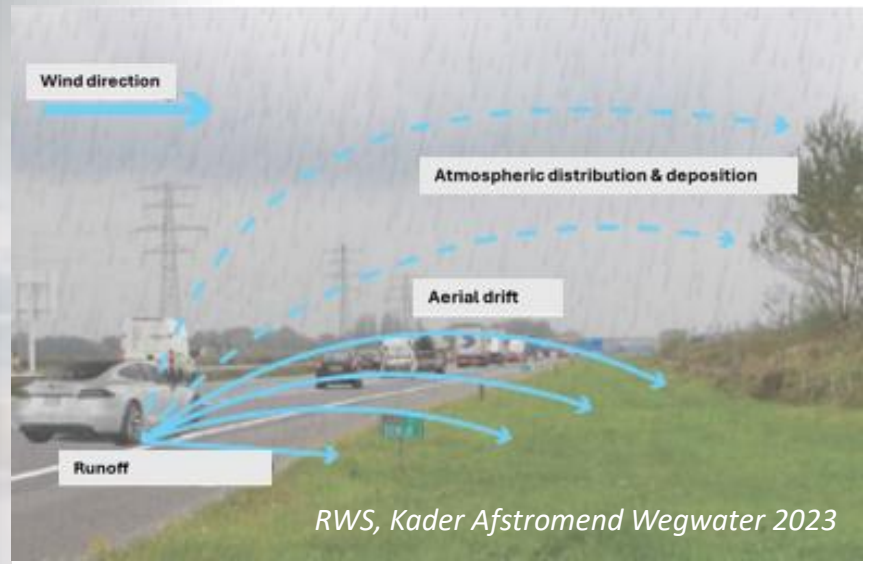


* *Activities undertaken in complementary projects GO-CAWH (see C4.1.4) and Deltares (see C3.3)*

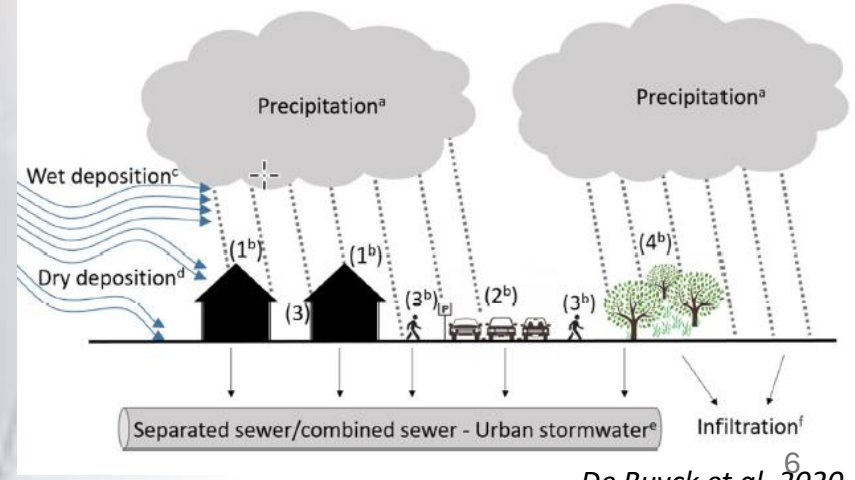


* *Primary concern of partners. They may work on more issues.*

Roadwater



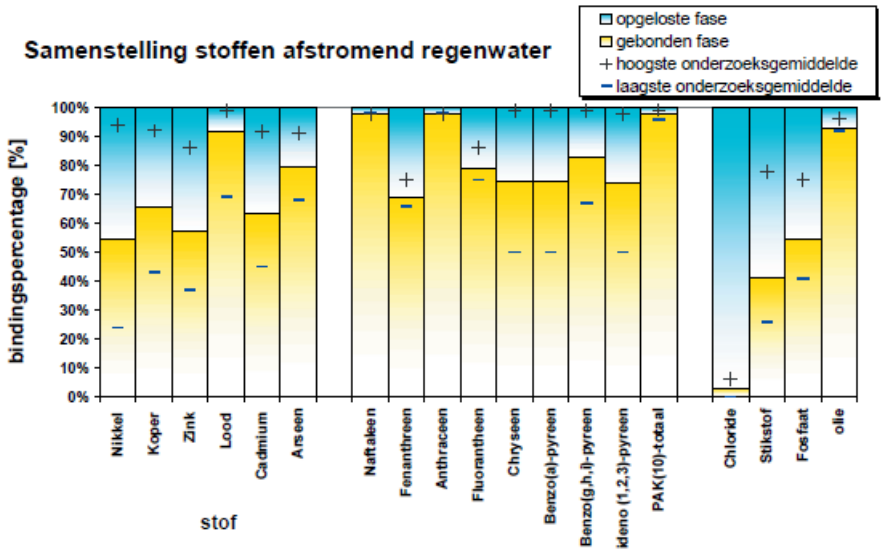
RWS, Kader Afstromend Wegwater 2023



De Buyck et al. 2020

Photo: Ben Birchall *

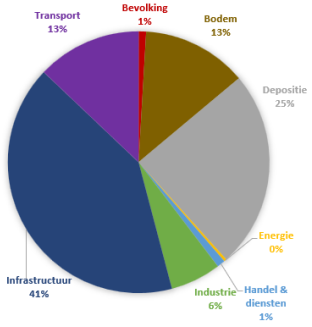
Parameter	eenheid	IJse Opwaarts	Afspoeling E411 kant Hoeilaart	Afspoeling E411 kant Overijse	IJse Afwaarts
Acenafteen	ng/L	12	120	56	17
Anthraceen	ng/L	6	460	590	10
As (totaal)	µg/L	1,07	3,8	3,3	1,2
Benzo(a)anthraceen	ng/L	5	2000	1700	20
Benzo(a)pyreen	ng/L	8	2600	2900	35
Benzo(b)fluorantheen	ng/L	13	4000	4800	54
Benzo(g,h,i)peryleen	ng/L	10	3000	3600	36
Benzo(k)fluorantheen	ng/L	15	1500	1600	18
BZV_5	mg O_2/L	1,5	8,8	9,1	2,1
CZV	mg O_2/L	19,1	141	118	15,6
Chryseen	ng/L	9	3400	2800	27
Co (totaal)	µg/L	<0,4	2,38	2,57	<0,4
Cu (oplossing)	µg/L	<2	14,5	12	<2
Cu (totaal)	µg/L	<4	169	174	5
Fenanthreen	ng/L	<30	1600		32
Fluorantheen	ng/L	25	4500	3800	54
Indeno(1,2,3-cd)pyreen	ng/L	<1	2300	3000	24
Apolaire KWS	µg/L	<100	2100	1900	290
N (totaal)	mg N/L	8,1	3,3	3,6	7,4
Pb (totaal)	µg/L	3,8	59	37	4,2
Pyreen	ng/L	21	4500	3400	47
V (totaal)	µg/L	1,8	16,5	19,5	2,2
Zwevende Stof	mg/L	12	146	139	58
Zn (oplossing)	µg/L	13	25	19	13,6
Zn (totaal)	µg/L	34,3	480	420	39,8
Dibenzo(a,h)anthracee n	ng/L	<1	510	700	<1



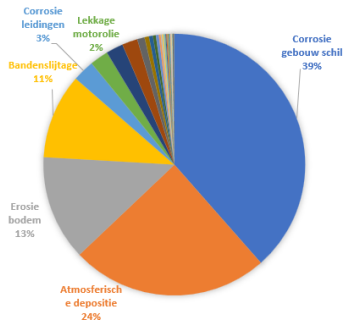
- **Tyre wear, road abrasion, oil leakage**
- **HM: Cu, Zn, Cd, Co, Pb**
- **PAH: Fen, Naft, …**
- **SS, N, salt, oil…**

Zink (bandenslijtage)

Bijdrage van alle sectoren



Subsectorale bijdrages



Legal boundaries to protect the environment

- European legislation
- National legislation
- France, Netherlands, Germany and Flanders
- Road water quality
  - “Environmental protection” and “use”

EU regulations

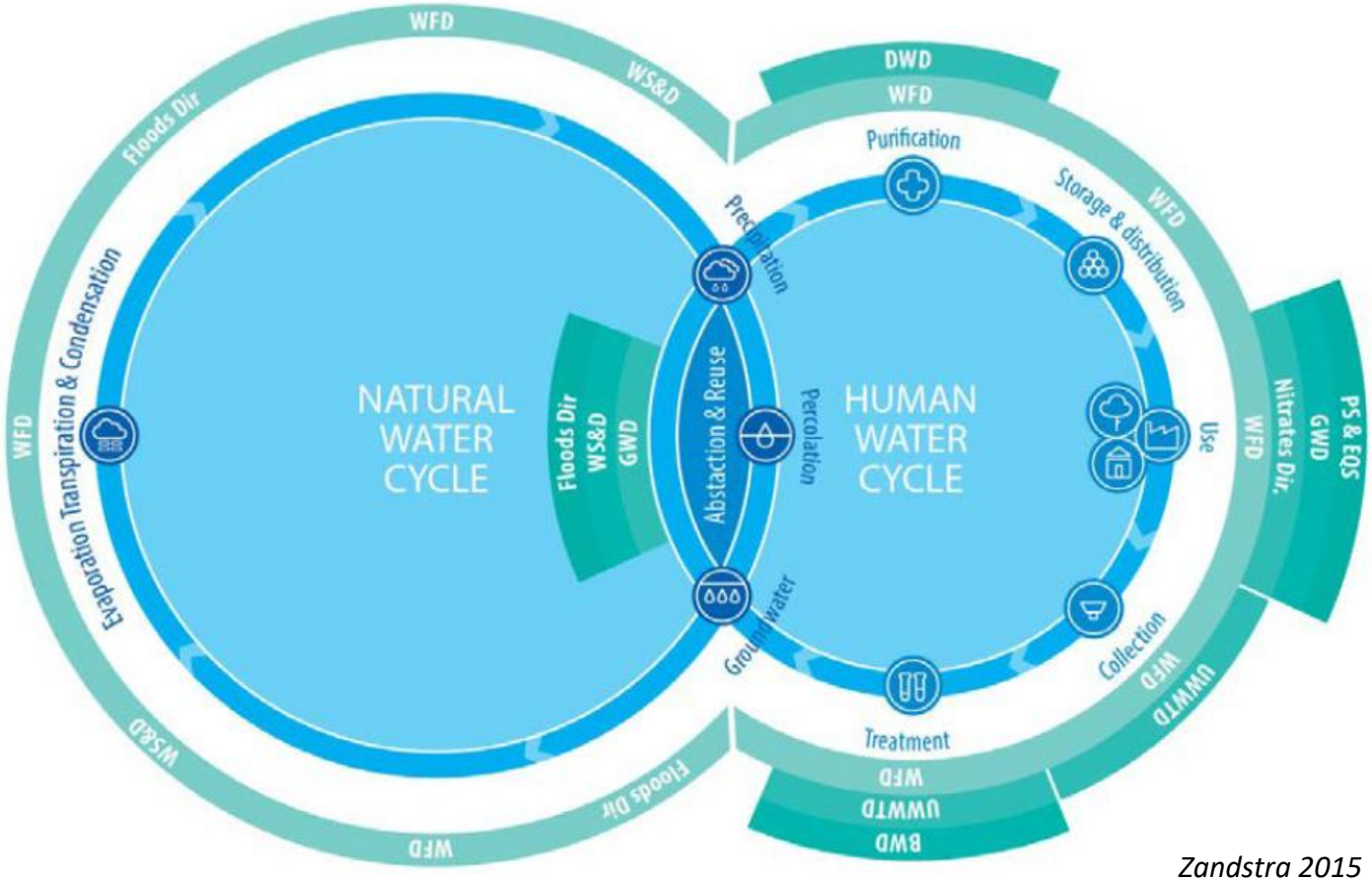
- Comprehensive **framework** of water-related legislation with common standards and objectives
  - to ensure sustainable use and protection of water resources
- Drives national policies, while allowing MS flexibility
  - Intermediate targets and timelines
  - Different measures
  - Involving stakeholders differently
  - Different approaches in monitoring and reporting exist
  - (different) alignment with other sectoral policies
  - …
- A **minimum EU standard** is set
- Innovation & best practices beyond minimum are encouraged

WFD, a game changer

- The Water Framework Directive (WFD), adopted in 2000, is the cornerstone of EU water legislation.
- It establishes a holistic approach to water management, aiming for ‘good status’ for all EU waters (rivers, lakes, groundwater, coastal waters).
- Emphasizes integrated river basin management, requiring member states to develop River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs).
- Surface water and ground water
  - GWD
  - EQSD (& PSD)
- Promotes public participation, involving stakeholders and communities in water management decisions

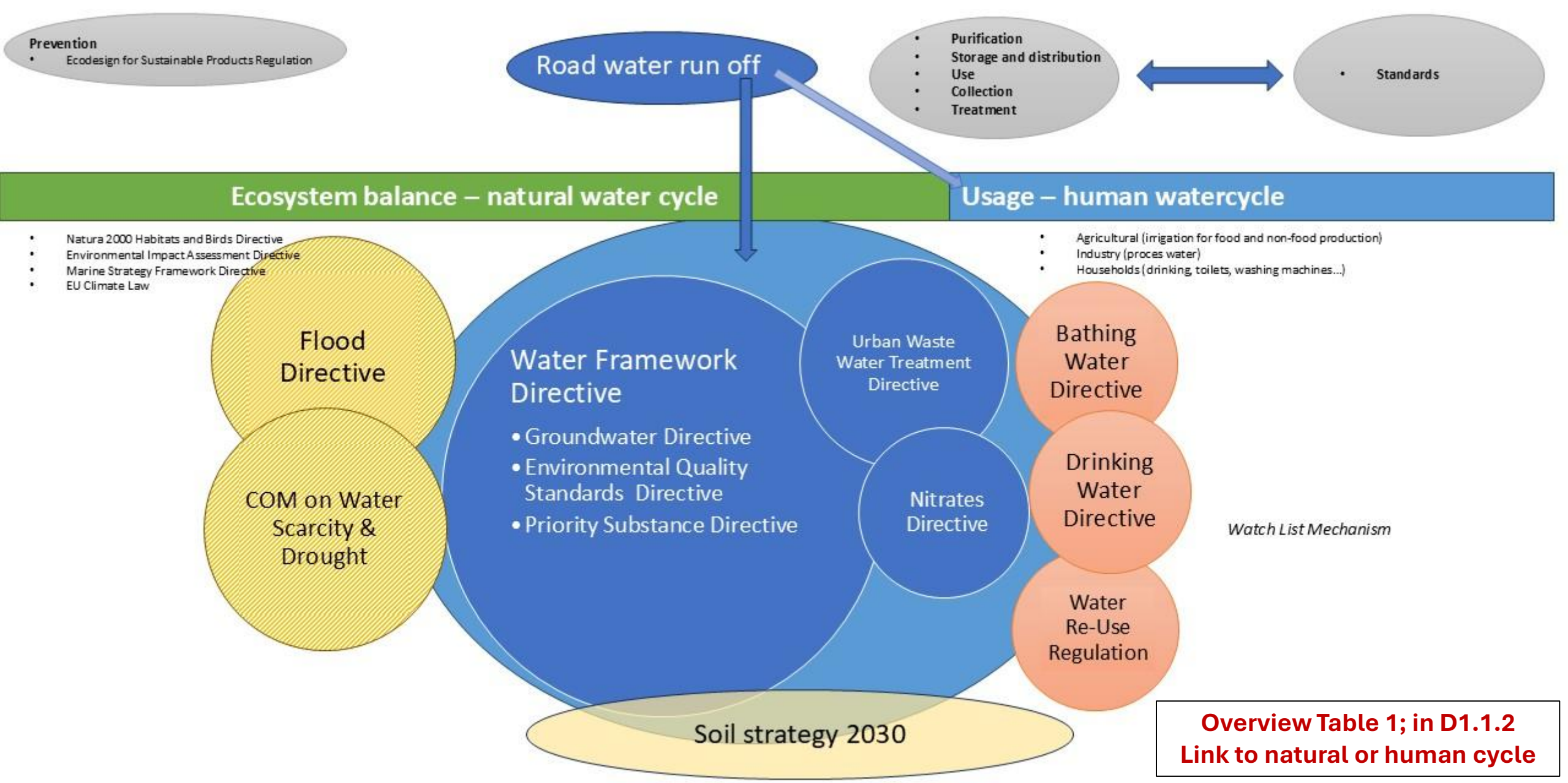
From small cycle to natural cycle

- These first “old” EU legislation typically relates to the human water cycle, also referred to as the small cycle, addressing human health directly and indirectly through resource protection by combining quality standards and emission controls



Zandstra 2015

- Approach shifted towards more integrated and restrictive environmental objectives, influenced by growing ecological awareness, towards the so called natural water cycle



Overview Table 1; in D1.1.2
Link to natural or human cycle

National policies relevant to roadwater quality & management

- Overview in Table 2
- Per country
  - Legal status “roadwater”
  - Legislation setting boundaries to roadwater quality and roadwater management
- Summary
- Exploring legal boundaries for road water use possibilities
- Discussion & future perspectives
- Recommendations

Flanders

- Vlarem II does not define polluted stormwater
- Legally roadwater runoff is considered non-polluted
- However, a definition could be deduced from other:

> *“polluted stormwater” means “rain, snow, hail, including thaw water, contaminated with pollutants or energy discharged directly or indirectly by humans, as a result of which human health may be endangered, aquatic life and ecosystems may be harmed, or any lawful use of the water may be interfered with.”*

Flanders

- Roads are not classified as a seperate category with emission standards for water
- However, there is existing legislation and guidelines (best available technique) for

“Contaminated stormwater from waste storage facilities”, published in 2015. A distinction here is made between polluted and non-polluted stormwater.

Flanders

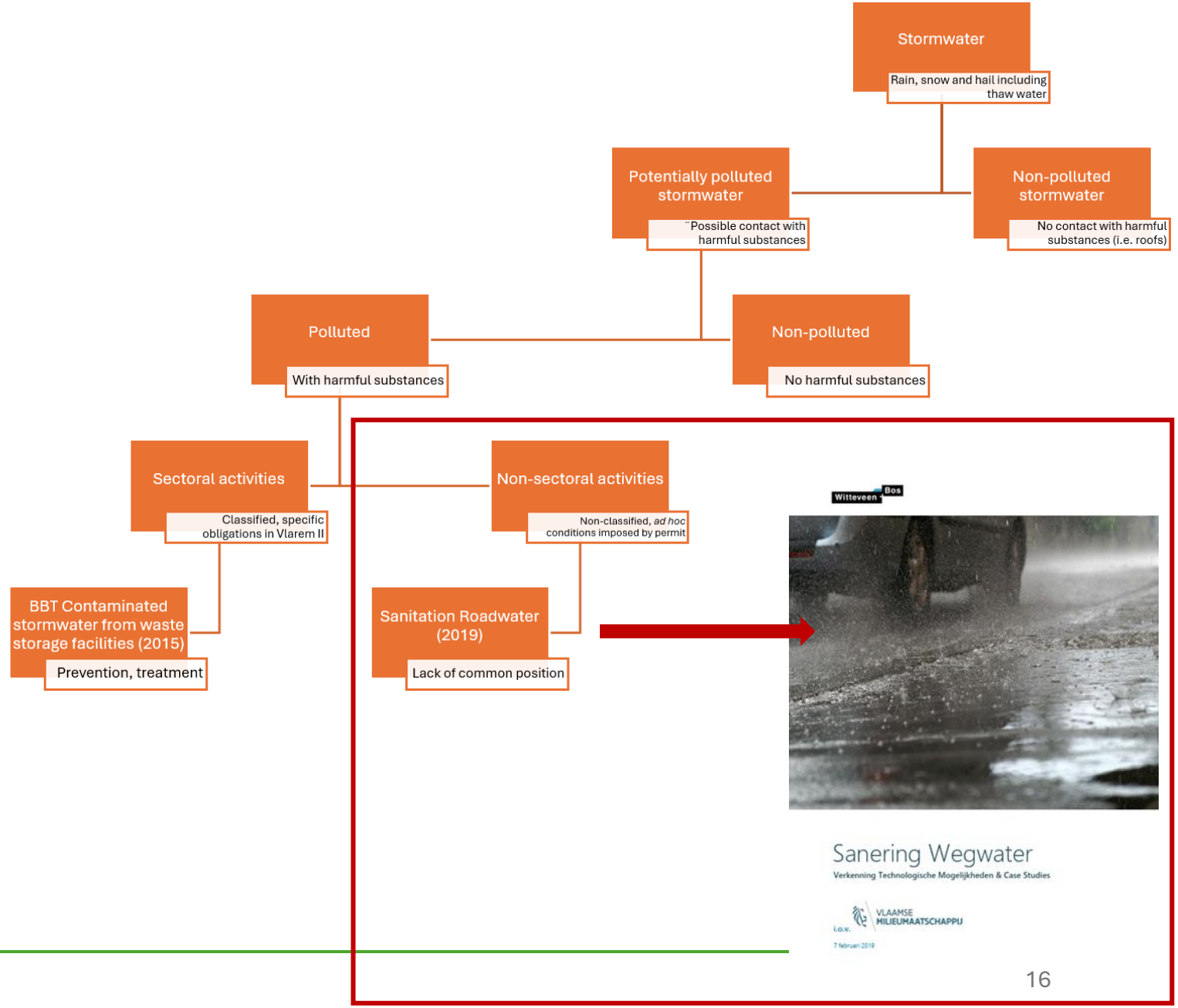
- Legislator assumes that **rainwater runoff from a roof, patio, driveway**, etc. is only contaminated to a limited extent, and is therefore considered unpolluted rainwater
- On **industrial sites**, however, stormwater can come into contact with pollutants, for classified facilities
  - container parks,
  - scrap yards,
  - tank farms

→ discharge standards (ICGS)

→ taxes

→ Oil separator, covered storage…

→ Best Available technique (2015)

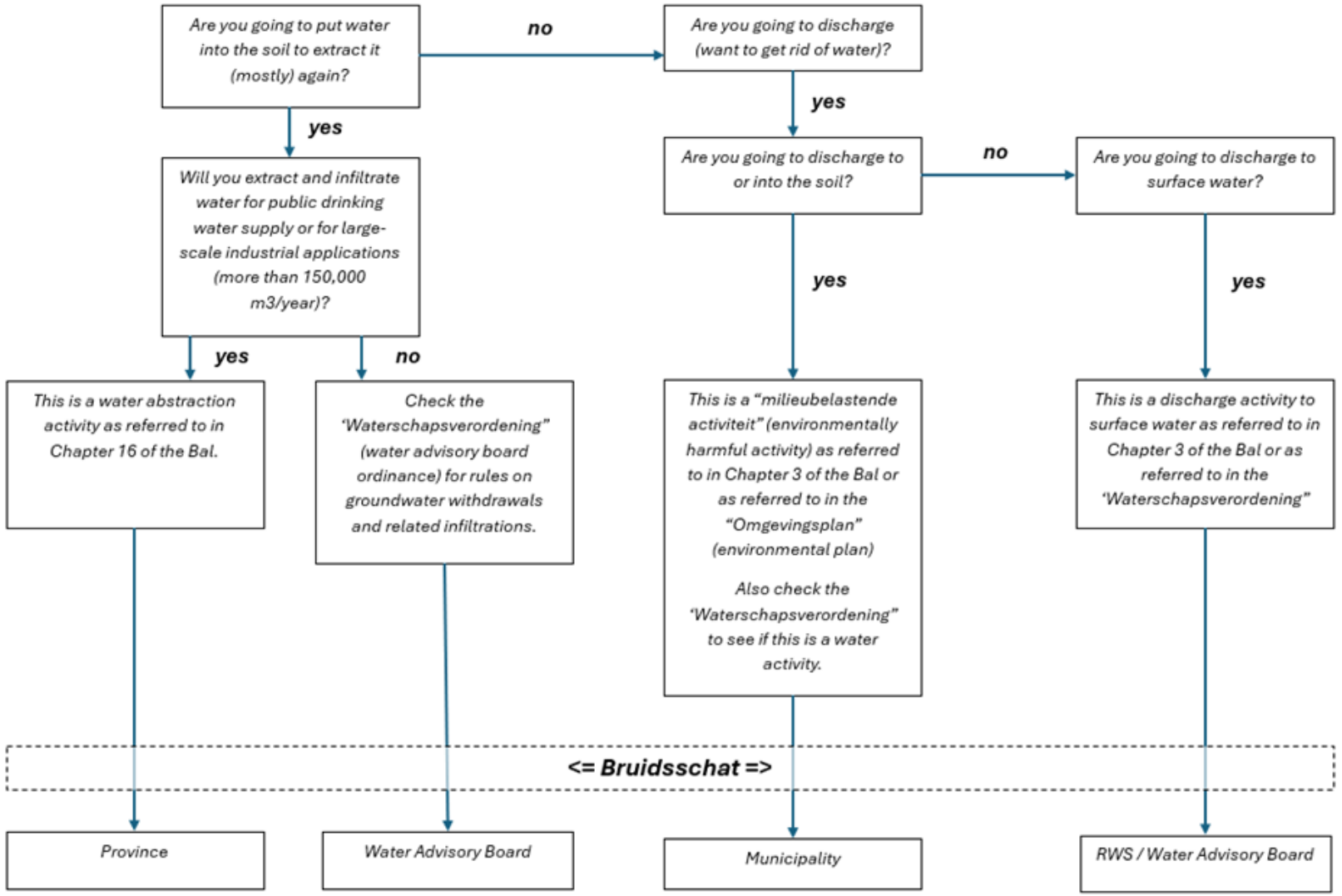


Flanders

- no specific obligations are defined for roads for its impact on the environment with respect to quality.
  - additional conditions via the necessary permits by the competent authorities involved
  - Environmental Impact Assessment (EIA). An EIR is an informative document and not a decision instrument.
- Currently, a common position on the quality aspect involving all necessary departments (groundwater, permits, waste water, surface water, soil) is lacking.
- Decoupling of non-polluted stormwater is largely encouraged, incl. infilitration in protection zones II and III (aboveground); with limited advice on pre-treatment
- Also considering and assessing the necessary minimum requirements to ensure quality of the environment should be covered.
- There is a ban on infiltration of rainwater into the soil when polluted rainwater is discharged from polluted surfaces of e.g. industrial sites, when classified in Vlarem (cf. earlier).

Netherlands

- Depends on where the roadwater is discharged to (water/soil); and whether it will be abstracted again or not
- Omgevingswet (2024)



Netherlands

- Within the period of 2007-2009 national legislation has been developed within the law of soil protection (“Wet Bodembescherming”) within the “Besluit Lozen buiten Inrichtingen” (Blbi, 01/07/2011) and “Infiltratiebesluit” - which in itself also links to the “Wet Milieubeheer” and the “Waterwet”.
- For municipalities the preventive measures that need to be taken, as previously regulate by the Blbi, are not specifically prescribed by the Omgevinsgwet and therefore not translated to specific measures required within the “Omgevingsplan”. However they should follow in the from the Duty of Care that is imposed.

Netherlands

- The roads that are managed by Rijkswaterstaat follow the Kader Afstromend Wegwater (2023) that is based on the previous regulations by BIbI & Infiltratiebesluit

- When roads managed by municipalities this may differ from previous regulations: within the “Omgevingsplan there are no specific reugulations through the Bruidschat (“Duty of Care”)

RWS INFORMATIE

Kader afstromend wegwater

Omgaan met het spanningsveld rond afstromend wegwater tussen enerzijds de wettelijke invulling vanuit de zorgplicht uit de Omgevingswet en anderzijds de doorstroming en veiligheid op het hoofdwegennet vanuit de Wegenverkeerswet.

Datum	7 december 2023
Versie	3.6
Status	Definitief

Netherlands

- When discharged in the sewer a permit is required and the “Wet Milieubeheer” is followed (updated 1/1/2025, dates back from 1996).
- The Water Immission Test is a (model) tool which is mandatory used when assessing a permit application for discharge activities into surface water and on a sewage treatment plant (Art. 8.88 Bkl) and environmentally harmful activities (Art. 8.9/8.10 Bkl) in order to meet the “no deterioration principle” of the Water Framework Directive

Germany

- It is in general mandatory, that the water volume, which cannot be naturally seeped due to the sealed highway, must be recirculated to the water cycle on another way
- There are technical regulations for the treatment of the roadwater before recirculation (BAB, B roads and L roads)
- Derived from the Waste Water Ordinnance
- Strictu senso, roadwater not considered harmful
- Sometimes, by exception, discharged to the sewer system, for B and L-roads

Germany

- In groundwater protection zone, regulations are more strict
- A vulnerability analysis of the surface and ground water is done; and roadwater treatment systems are designed with this vulnaribilty in mind
- When the natural cycle is influenced, the law on organisation of the water balance becomes relevant (applicable to SW and GW)
- Non-public software tool (model) developed by the NRW road construction authority (“Straßen.NRW”) together with water authorities, for motorways, B-roads and L-roads (not public).
- For renovations and constructions in water protection zones, to calculate **pollutant concentrations at the soil-groundwater interface**. It also helps water authorities with planning, approval and threshold values by giving information about regulations of the district governments.
- Eases permit approval

Germany

- Costs related to roadwater treatment are paid by the road authority as part of the public services of the state
- This responsibility is based on the fact that road structures interrupt the natural water cycle, which must be compensated for by roadwater treatment.
- Roadwater authority constructs the treatment plant and ensures the maintenance
- Water quality testing is coordinated by the local water authority

France

Objectifs de qualité ou qualité des eaux de surface[2]	Usages				
	Sans AEP[1]			AEP[1]	
	Nombre d'usages à moins de 5 km[3]			Distance[3]	
	< 2	2 – 3	> 3	1-10 km Rouge	> 10 km Jaune
1A - 1B	Jaune	Rouge	Rouge		
2 - 3	Vert	Jaune	Rouge		

- No specific regulations related to its quality or its use
- Projects are examined to determine if they have direct or indirect impacts on the aquatic environment (surface water, groundwater, wetlands…) at each step (construction phase, operating phase, exceptional conditions). Then regarding to the "Nomenclature Eau", the project may be subject to various regulations.
- For a road project an analysis of the vulnerability of surface water and groundwater must also be carried out. Roadwater management must take into account this vulnerability to prevent the input of harmful substances to the environment.

France

- Infiltration of rainwater is demanded by most planning documents. For example, current rainfall (first few millimetres) should, if possible, no longer be discharged into watercourses.
- Developers must also manage their stormwater discharges up to a return period of 20 to 100 years, by installing a buffer system, to avoid floods problems downstream. Or have to think how to manage exceptional return period with “accepted” flooded area.
- During periods of drought, when a water shortage is foreseeable in a given geographical area, gradual and temporary water restrictions are triggered by prefects to preserve priority uses.
- Since 2015, every year with the exception of 2021, more than half of the departments in the main land of France have experienced summer restrictions over all or part of their territory. Over the period 2002-2014, such a situation had only occurred four times. Then in April 2023, a plan dedicated to resilient and concerted water management has been published. Among the 53 actions, some relate to (i) increase water sobriety, (ii) use alternate water resources.
- .

France

- The latest French regulations focus mainly on the reuse of rainwater from rooftops
- As roadwater is not listed as a water unfit for human consumption, the following regulations are not directly applicable but the stakes are similar and can be a source of inspiration for the reuse of roadwater.

Décret n° 2023-835 (29/08/2023)	Decree on the uses and conditions for reuse of rainwater and treated wastewater	This new decree, revoking Decree n° 2022-336 that was in place since March 2022, should facilitate the development and implementation of water reuse schemes in the country
Arrêté du 14 décembre 2023 on watering green spaces with reuse water	Complements decree 2023-835	
Arrêté du 18 décembre 2023 on crop-irrigation	Complements decree 2023-835	
Décret n° 2024-33 (24/01/2024)	Authorizes certain uses of treated waste water in the food sector depending on the quality class (A-D)	Supplemented by a decree and order dated July 8, 2024. The permitted uses concern the preparation, processing and preservation of all foodstuffs and goods intended for human consumption.

Summary

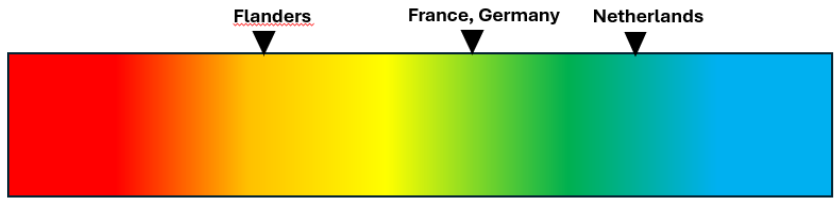
- The roadwater quality is **not classified as environmentally harmfu**l (no dedicated legal status)
- **Preferential order of discharge**
- **Different recommendations and technical guidelines** from road authorities to meet no deterioration principle (Duty of Care) in NL, GE, FR
- Not existing (yet) in FL

¤	Netherlands¤	Germany*¤	France**¤	Flanders¤
1¤	Prevent or limit runoff roadwater¤	¤	¤	Avoiding runoff¤
2¤	Prevent or limit pollutants in runoff roadwater;¤	¤	¤	(Re)using rainwater¤
3¤	Separation of water flows, with respect to contaminants¤	Separation of water flows, with respect to contaminants (for federal highways or when in ground water protection area a treatment is installed in vulnerable areas)¤	Separation of water flows, with respect to contaminants (for federal highways or when in ground water protection area a treatment is installed in vulnerable areas)¤	Infiltration, by preference aboveground¤
4¤	Soil infiltration (soil passage) at source¤	Soil infiltration (soil passage) at source¤	Soil infiltration (soil passage) at source¤	Buffering and delayed discharge¤
5¤	Discharging (indirectly) to a national water body¤	Discharging (indirectly) to a national or local water body¤	Discharging (indirectly) to a national or local water body¤	Discharge rainwater piping¤
6¤	Discharging (indirectly) to local water¤			Discharge to mixed sewer¤
7¤	Discharging to local sewer (if permitted)¤	Discharge to the sewer, when space is limited (often in cities)¤	Discharge to the sewer, when space is limited (often in cities)¤	¤

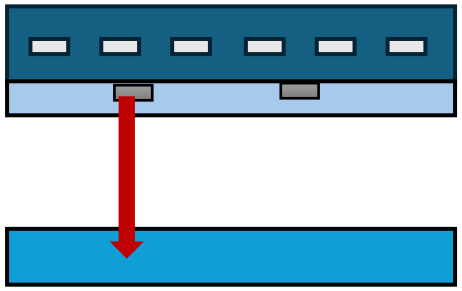
*Based on personnel communication input from within the RRR associated beneficiary network¶

Summary

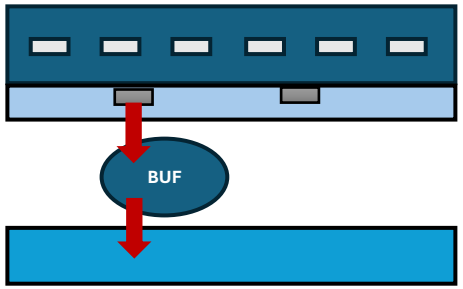
- Avoid pollution in runoff (ecodesign)
- Remove pollution within the discharge by treatment in f(natural cycle element) to which disposed (SW, GW)
- Decentralized preferred in terms of maintenance assuming the risks for groundwater infiltration risks are fully managed (PFAS, microplastics…?)
- Ranking the countries



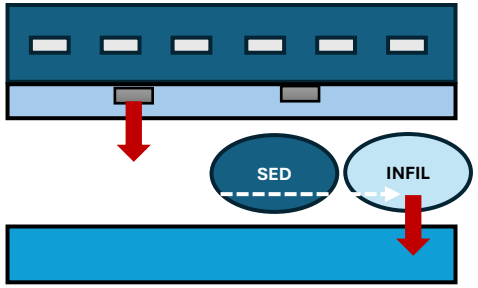
Direct discharge via rain sewer piping



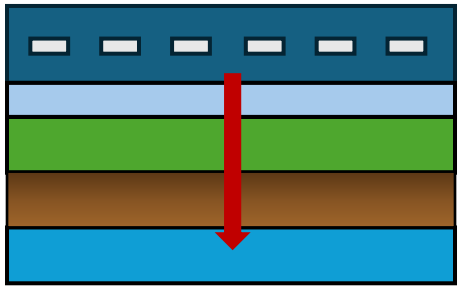
Indirect discharge via buffers



Central, treatment units



Decentral, shoulders



Flanders

Germany, France

Netherlands

Summary

- Legal patchwork among different levels of competent authorities
  - Country differences
  - Regional differences;
  - Legal status of the runoff water (considered a waste water?)
  - The preferential order of discharge: in to which environmental compartment it is discharged (surface water, groundwater, soil)
  - Different levels of competent administrations involved in providing the environmental permit (national, provincial, local; water, nature, soil),
  - Additionally, the vulnerability of the surroundings (Natura2000, nature reserves, drinking water protection area, surface water for drinking water abstraction or not etc.).
- Another level of complexity (re)use depending on the types of water demand in the surroundings.

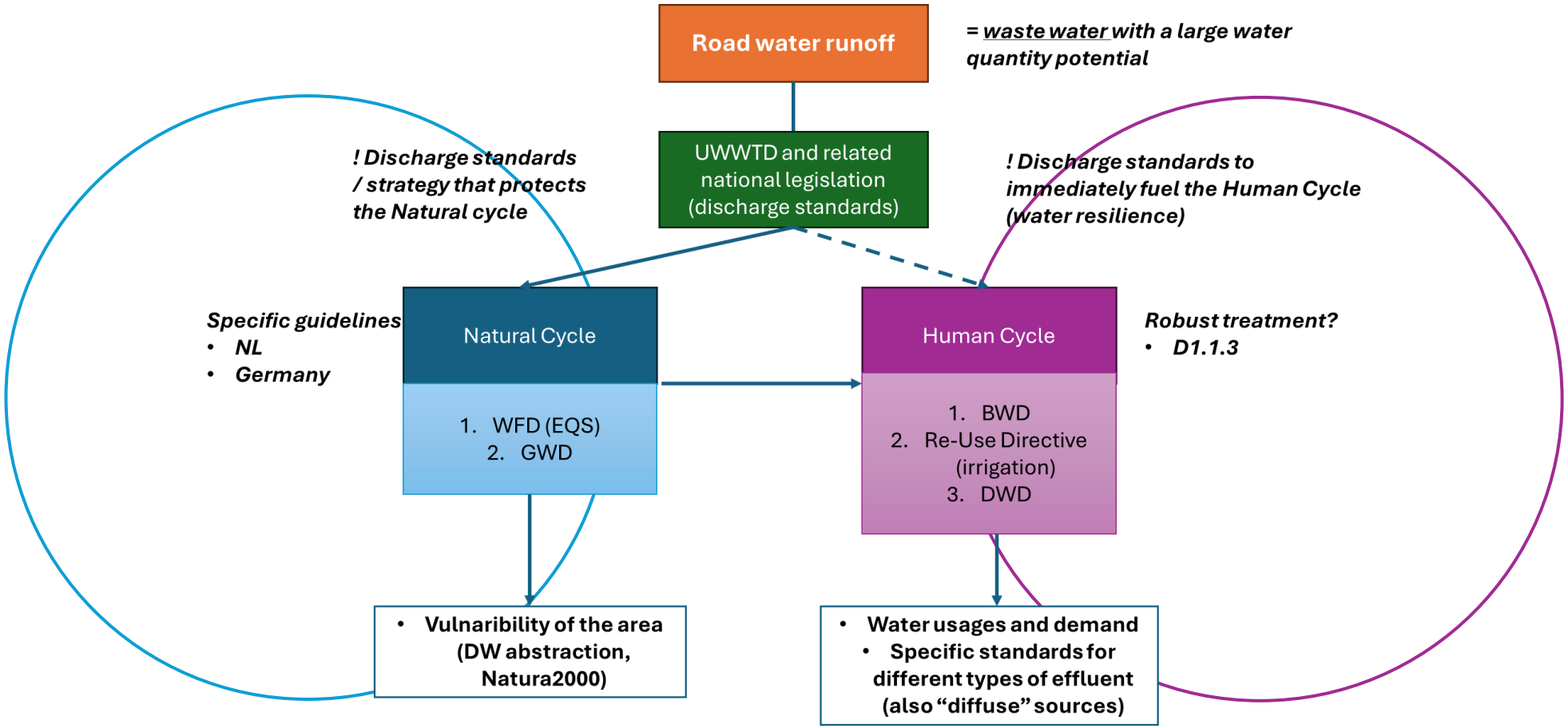
Exploring legal boundaries for road water use possibilities

- Currently not done
- Some project experiences (Water Smart projects)
- Nature can be a user (Natural cycle “feeds” the human cycle)
- Lowering use of “high drinking quality water” for low quality, second circuit uses, i.e. for car washes
- Cost-beneficial?
- EU frameworks that are relevant -> set of Standards

1. **Waste water quality**
2. **Surface water quality**
3. **Bathing Water**
4. **Irrigation Water**
5. **Ground water**
6. **Drinking Water**

Overview in Annex II
Chapter 8, D1.1.2

Discussion & future perspectives



Natural Cycle: ensure full protection of the environment

- No specific rules, only technical guidelines
- Permit, decentralized competence and legal patch work of rules
- *Ad hoc* decision
- Clear framework could be beneficial
- Remaining concerns
  - PFAS
  - Microplastics
- Responsabilities and financing

Country	Surface water	Industrial water	Pumping water/ground water	Bathing water	Drinking water	Soil when re-used
Flanders	0,65 ng/L	Permit required when > 20 or 50 ng/L	<10 ng/L when returned (pumping water)	Sum PFOS, PFOA, PFNA & PFHxS <0,2 µg/L (child) <1 µg/L (adult)	Sum PFAS-20 < 0,1 µg/L Total PFAS < 0,5 µg/L	PFAS-20 < 15 µg/kg ds
Netherlands	0,3 ng/L (PFOA) 0,007 ng/L (PFOS)	Permit required when > 20 or 50 ng/L	*nav*	Sum of PFAS in PFOA eq. <0,280 µg/L (<0,071 µg/L in swimming pools)	Sum PFAS-20 < 0,1 µg/L	3 µg/kg ds (PFOS) 7 µg/kg ds (PFOA) 3 µg/kg ds (other PFAS)
France	PFOS surveillance since 2022 (5 PFAS)	PFOS<25 µg/L Mesures of PFAS-20 required for thousands of plants	20 PFAS to measure starting 2026 < 2 µg/L (before treatment)	*nav*	Sum PFAS-20 < 0,1 µg/L Total PFAS < 0,5 µg/L	*nav*
Germany	*nav*	*nav*	*nav*	*nav*	Sum PFAS-20 < 0,1 µg/L and *Sum PFAS-4* (PFOA, PFNA, PFHxS and	*nav*

Table 4 Standard package for analysis of drainage water and additional mobile pollutants of concern

	Soil	Groundwater
Standard package for analyses of drainage water		
pH		+
pH-KCl	+	
Conductivity and temperature		+
Dry Matter content (%)	+	
Organic matter content (%)	+	
Clay content (%)	+	
Heavy metals (8: lead, zinc, cadmium, cupper, nickel, arsene, mercury, and chrome(III+))	+	+
BTEX (4: benzene, toluene, ethylbenzene, xylene)		+
Mineral oil	+	+
PAH (16 poly aromatic hydrocarbons: naphthalene (NAP), acenaphthylene (ACY), acenaphthene (ACE), fluorene (FLU), phenanthrene (PHEN), anthracene (ANTH), fluoranthene (FLTH), pyrene (PYR), benzo[a]anthracene (B[a]A), chrysene (CHRY), benzo[b]fluoranthene (B[b]F), benzo[k]fluoranthene (B[k]F), benzo[a]pyrene (B[a]P), benzo[g,h,i]perylene (B[ghi]P), indeno[1,2,3-c,d]pyrene (IND), and dibenz[a,h]anthracene (D[ah]A))	+	
VOCl (11 volatile chlorinated compounds: 1,2-dichloorethane, dichloormethane, tetratchloormethane, tetrachloorethene, 1,1,1-trichloorethane, 1,1,2-trichloorethane)		+
Vinylchloride		+
Additional pollutants of concern		
Siltation parameters (Na, K, Cl-, en SO4 2+…)		+
Heavy metals (cobalt)		
Fluoride		
PFAS (PFOS, PFOA…)*		+
especially when re-use is also considered		

Human Cycle: maximizing use possibilities for Water Resilience

- Water Resilience Strategy
  - **Zero pollution** objectives
  - Building **a water-smart circular economy**
  - Anticipate water-related climate risks
  - Support disruptive research & innovation activities
  - Leverage digital water opportunities
- If we consider the requirements, we see limited chemical parameters within the re-use act for irrigation or bathing. However, a profound risk based assessment should be taken into account.
- Many components are substances of high concern (REACH) and for PFAS often a separate communication and set of standards has been issued for the different environmental compartment by the Health Departments

Human Cycle: maximizing use possibilities for Water Resilience

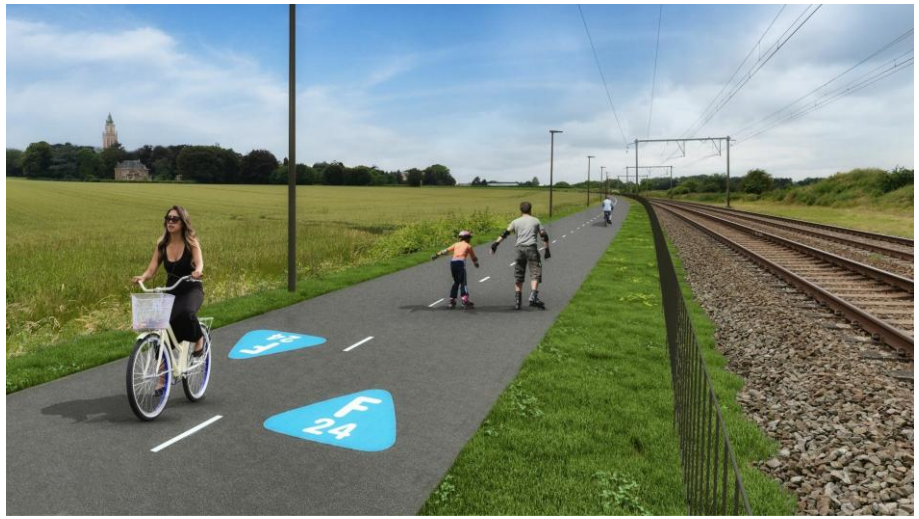
- Second circuit water (car wash, cleaning, toilet flushing) – separate circuit !
- Human consumption: microbial component
- Cost-benefit <-> supply and demand
- Difficulties for treatment to consider: fluctuating flow rate, wide range of contaminants

Recommendations

European Commission

Storm-water Directive

Managing the impact of different types of stormwater, inc. Roadwater as a specifoc type, setting a minimum standard



Source-oriented (prevention)
Model shift

Recommendations

1. Develop a European Stormwater Directive that integrates both the quantitative **and qualitative** minimum requirements for different type of stormwater classes, integrating the requirements from the UWWTD, WFD, GWD, FD, Soil Strategy to better protect the natural environment.
   Or define it within the UWWTD as a specific type(s) of “wastewater” related to stormwater runoff.
2. Develop **(1) a consensus decision framework and (2) technical guidelines** should be developed and provided for the different types of stormwater management (i.e. roadwater, roof water, railway water), managed and monitored in all countries by the **water managing authorities**, and be compliant to the Stormwater Directive, when it is available.
3. In the meantime **model tools** are needed to evaluate the impact on surface water and groundwater, translating the impact to the receiving waterbodies, so the existing standards can be used to meet the “no deterioration principle”.
4. Linking the insights gained to the Climate Adaptation and Water Resilience Strategy, **promoting maximal safe infiltration and re-use.**
5. Screen and **update the existing legislation** of bathing water, playgrounds, drinking water, irrigation etc. **taking into account the alternative water sources** for re-use that might be considered towards the future (are all necessary pollutants screened by the current legislation which were not designed for this alternative sources of water)
6. **Continuous research and development, following-up on the harmful substances** (PS and watch list) of concern, continuously evaluating and adapting the strategy to anticipate and tackle stormwater related pollution risks (i.e. PFAS, micro-plastics).
7. **Be part of a learning network on water re-use**

Questions, remarks?

- Menti: **8681 6299**

1. Do you also think we need a stormwater directive, incl. roadwater as a type, integrating quantity and quality aspects?
2. Do you think decentralized approach (infiltration towards the shoulders) is the best approach?
3. Would you consider roadwater a good alternative source of water?
4. For which use would you personally use roadwater? (when cleaned according to the standards in the existing EU frameworks)

- https://www.mentimeter.com/app/presentation/al8efkv4qjw34h6emug4mo49csmd6oce/edit?question=4mfmwe5y5m3a

Thank you

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