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OSPAR Marine Litter Regional Action Plan

Action 42 – Supplementary questionnaire on the treatment of storm water by 'separate storm water systems'

1. Introduction

Litter from land-based sources reach the North-East Atlantic Ocean through the discharge of storm water, waste water, littering or atmospheric deposition. Litter can enter the sea directly, or be transported to the sea by rivers and other water ways. Although the sources of marine litter (and to some extent also the quantities of litter released from these sources) are fairly well investigated, information on the relative importance of the different pathways is still limited.

In 2014, OSPAR agreed its Regional Action Plan for Marine Litter (RAP ML) for 2014-2021. Action 42 of the OSPAR RAP ML is to:

Investigate and promote with appropriate industries the use of Best Available Techniques (BAT) and Best Environmental Practice (BEP) to develop sustainable and cost-effective solutions to reduce and prevent sewage (i.e. domestic waste water) and storm water related waste entering the marine environment, including micro particles.

In order to gain a better understanding of the issue, the action leads for Action 42 (Sweden, Norway and Ireland) have undertaken work to develop the following documents:

1. A report on techniques to reduce litter in wastewater and stormwater (2016);
2. A technical synthesis report on technologies for litter reduction from waste- and storm water and supply (2017); and
3. An OSPAR Background document on BAT/BEP in urban wastewater treatment systems, with a focus on stormwater related litter in particular microplastics (published in 2019).

Stormwater is defined as 'water from rain or melting snow that runs off urban surfaces'. Stormwater is either drained into the sewage system and treated in a waste water treatment plants (WWTP), known as a "combined system", or drained into a dedicated storm water system from where it is transported to the receiving water with or without stormwater treatment, known as a "separate sewer systems".

The 2019 OSPAR background document reviewed current practice for WWTPs as well as stormwater systems connected to WWTPs (combined systems). However, there was limited information on storm water management with separate sewer systems. Therefore, to further understand the issues associated with separate systems, the leads for Action 42 decided to collect information from OSPAR Contracting Parties via a targeted questionnaire[1] which was first circulated in 2019, with some additional responses being received in early 2020. This report presents a summary of the responses received, and therefore a snapshot of the current situation at the time of the questionnaire, i.e., in 2019/2020.

The collected responses from the questionnaire are intended to be used for the purpose of producing guidance on Best Available Techniques (BAT) and Best Environmental Practices (BEP) for stormwater management to reduce quantities of litter entering the marine environment. Which in turn could serve the purpose of upgrading policy decisions, within the OSPAR Contracting Parties and nationally, primarily in connection with the implementation of the OSPAR Regional Action Plan on Marine Litter (Action 42) and the Marine Strategy Framework Directive (MSFD) descriptor 10 which concerns marine litter.

2. Summary of responses received

A total of 30 responses were received from 11 Contracting Parties, including Belgium, Denmark, Germany, Iceland, Ireland, Norway, Portugal, Spain, Sweden, The Netherlands, and the UK. The majority of the respondents were from the national or local environmental authorities, but there was also one from a private municipal water and sewage company. A full list of the organisations that submitted responses is presented in **Annex 1**.

3. Data on stormwater and quantities that undergo some form of treatment

The proportion of stormwater that underwent some form of treatment was not known for the majority of countries as no data was available or collected on this topic, however for those that had data, the percentages of stormwater that underwent treatment varied greatly, from approximately 10%, to approximately 75%. Highlights of the responses received for each Contracting Party are listed below:

- In Belgium, the information is gathered from measurements of flows of WWTPs and from models, it is estimated that 95-98% (depending on the installation and quality of the

[1] Questionnaire accessible via link: Questionnaire on the treatment of storm water by 'separate storm water systems'.

sewage system) of the total flow entering the connected sewage system (wastewater + rainwater) is treated on the WWTP.

- In Denmark 26% of the total number of separate sewer and combined sewer have a treatment process.
- In Germany, 2 475 601 * 1000 mÂ³ (2016, DESTATIS) is treated in total; but there is no proportional value in relation to the total quantity.
- In Iceland there is no specific information for stormwater, but approximately 74% of urban waste water goes through some kind of treatment. Most of the agglomerations have combined system still.
- In Ireland, many respondents stated that no data was available, but one respondent estimated that in urban areas, up to 50% of stormwater overflows would be directed through a storm system direct to river outfalls with little treatment, the remainder via combined sewers.
- Overall national data is not available in Spain. Storm water drainage systems are managed by the local authorities. In addition, the current legal regulations do not include a specific obligation to notify this information to the national authorities. In Spain, there are more than 150,000 km of collecting systems (80% of them are combined systems). There are more than 500 storm water tanks in Spain (some of them with a capacity above 400,000 cubic meters). The usual procedure is to design urban waste water treatment plants (UWWTPs), considering a peak flow several folds higher than the nominal flow entering the pre-treatment and primary treatment in the UWWTPs, in order to be able to absorb part of the most polluted storm water entering at the beginning of a storm event and thus reducing the negative impact in the receiving waters.
- The proportion of combined self-discharge pipes for wastewater, where storm water is led to waste water treatment plants, is roughly 10-15% in Sweden.
- Norway has no separate data on stormwater, the same situation for Portugal, UK and the Netherlands. In Norway the urban run-off is normally treated in UWWTPs. Road run-off is normally treated in detention ponds.

4. The most commonly used techniques in each Contracting Party (e.g. wetland storage, urban green structures, natural soil infiltration, filter techniques, underground sedimentation practices)

A number of different techniques were sighted for dealing with storm water, including the use of ponds and basins, underground sedimentation, urban green structures, soil infiltration and storm water tanks. However, the techniques sighted vary between the different OSPAR Contracting Parties, and indeed within countries (i.e. the type of treatment is based on the requirement for water quality in the receiving waters). Highlights of the responses received for each Contracting Party are listed below:

- In Belgium, the aim is to address the problem at the source by installation of separated systems (almost 20 years common practice) connected with green drainage system (infiltration ditches) or rivers. This is adequate but costly and time-consuming. If not possible we use underground sedimentation tanks to upgrade the storage capacity and thus reduce overflow. Virtually all our WWTP process 6 times the dry weather flow fully biologically (discharge demands of the UWWTD). This is a major element in the reduction of the impact of overflows.
- In Denmark underground sedimentation and over ground stormwater sediment basin are most commonly used techniques. The purpose is to reduce nutrients and organic substances and to retard the water flow.
- In Germany, the most commonly used techniques are rainwater overflow tanks and rainwater retention basins, however to a lesser degree, purification basins for rainwater are also used. Purification basin for rainwater separates sludge and particles (sedimentation) and oil and grain (flotation), retention soil filter (Retentionsbodenfilteranlagen) separates particles, soluted substances and pathogens.
- In Iceland, it is stormwater drains and ponds.
- In Ireland, a variety of responses were received with the most common being underground sediment systems and natural soil infiltration. In addition, respondents also mentioned wetland storage, soakpits, filter techniques, direct discharge to watercourses, Chlorintation, new techniques for green sustainable solutions for new developments (wetlands, stone filtration SUDS solutions) with legacy developments having little SW treatment solutions (some oil interceptors at outflows and some underground attenuation chambers).
- In Norway, separate treatment is normally conducted in detention ponds, particularly outside urban areas.
- For Portugal it is natural soil infiltration.
- In Spain the most commonly used technique is to build storm water tanks and treat these waters afterwards in UWWTPs. Spain has a technical guidance document to guide local authorities when constructing a storm tank. More recently, urban green infrastructures have been implemented in many places in order to reduce the amount of storm water entering the collecting systems and the UWWTPs facilities.
- In Sweden it is sedimentation ponds and basins.
- In the Netherlands it is urban green structures and underground sedimentation practices.
- For the UK, Sustainable Urban Drainage Systems (which include urban green structures in particular detention basins and ponds, filter drains and swales) with above ground treatment preferred. The type of treatment is based on the requirement for water quality in the receiving waters.

5. Evaluation of the performance or effectiveness of the most commonly used techniques listed in the section above

Some, but not all Contracting Parties collect information on effectiveness of techniques for treating stormwater. Highlights of the responses received for each Contracting Party are listed below:

- Belgium is currently gathering more information to get a better insight of performance and effectiveness.
- Denmark has reports on monitoring the effectiveness regarding removal of nutrients, organic substances and micro pollutants.
- Evaluations of for example different sustainable urban drainage systems and of detention ponds and treatment effects has been done in Norway (link can be shared).
- Spain consider that in those places where a storm water tank has been installed, it has become clear that water quality has significantly improved according to the analytical results obtained (ie. parameters such as COD, BOD and suspended solids).
- In Sweden mostly because since back in time sedimentation ponds and basins is considered to be robust, reliable and that larger areas were often available. Today Sweden even has studies on it.
- In the UK, effectiveness for treatment has been set in Scotland through Scottish Water standards and specifications, and the CIRIA Suds Manual. If treatment systems are built to these standards then they are deemed effective in terms of performance. The manual was researched and designed by leading UK experts using best available technology for the treatment of pollutants for surface water. The manual details the performance and effectiveness of the different techniques.
- The Netherlands, Iceland, Ireland, Portugal and Germany have answered that they do not have any evaluation of this kind.

6. New treatment technologies under development

There are a number of new treatment technologies under development, and for some Contracting Parties there are already established testing sites for these new technologies. Highlights of the responses received for each Contracting Party are listed below:

- In Belgium, some new technologies are already being tested at full scale testing sites, including treatment of quality of overflow water by mechanical devices (chemically boosted), and research locations where they try to infiltrate the majority of the storm water in heavily urbanised surroundings.
- For Ireland, there are some regional examples of new technologies being tested, including the installation of five integrated constructed wetlands (ICW) in urban parks in the county, and responses indicate that other regions in Ireland are considering this also. In addition, there are considerations to use green drainage solutions using filter media around trees and planted areas, as well as Green Infrastructure on planning conditions, green and blue

roofs, rain gardens & planters, swales, rills, filtration ditches, and incorporating climate mitigation and public health (air pollution) improvement and protection.

- In Norway Klima2050 is looking to develop new road run-off treatment technologies. The project will be finalized in 2021.
- Spain consider it very useful to reduce the impact of storm water events in the receiving waters by installing storm water tanks prior to the UWWTPs facilities. Spain is currently working on a new technical document for the design of storm waters treatment facilities according to the Royal Decree 1290/2012, regulating the public hydric domain in Spain. Among the objectives of this Royal Decree, it is to minimize the negative impact of these storm events by regulating the discharge permits in the public water domain.
- Some techniques (ex Sedipipes, new for Sweden) as well as some substrates/soils for green solutions (ex. for raingardens) are being tested in Sweden but are not evaluated yet.
- UK reports no new treatment options with regards to SUDS, but they always promote the use of above ground systems for biodiversity and maintenance reasons.
- The Netherlands, Denmark, Germany, Iceland, and Portugal report that no new treatment technologies under development.

7. Plans to minimize emissions of litter via storm water at a national, regional and local scale

There are varying degrees of progress across OSPAR Contracting Parties. Although some countries are undertaking activities such as projects, assignments and awareness campaigns, or litter picking regime requirements, many have no dedicated plans in place. Highlights of the responses received for each Contracting Party are listed below:

At a **national scale**

- For Belgium the Flemish region are responsible for the environmental issues.
- In Germany there are national discussions underway related to German waste water ordinance, but it is the competence of the federal states in Germany, so no national overview.
- Iceland has a national an awareness campaign (national-local) in 2020, in cooperation with municipalities, utilities companies and Health inspectorate.
- The Swedish EPA is working to increase the guidance about the stormwater issues that the authority is responsible for. The aim is to do so and to develop the guidance in consultation with other concerned authority in Sweden.
- The Netherlands separate sewage rainwater (national – local) and they report a single use plastic directive.

- In UK national standards (Design Manual for Roads and Bridges) requires overseeing organisations to take appropriate steps in assessing and mitigating environmental impacts of prospective schemes. Requirements are included in these standards to ensure sustainable design. The DMRB sets requirements for the design of specific elements such as grilles for culverts on water courses, which will directly have effect on this area. For surface water UK would require that the CIRIA SUDS manual was used to effectively design a surface water management system, however there is nothing specific for litter. For combined systems UK require screening of all new discharges or unsatisfactory discharges from the collection system up to a 1 in 5 year storm event. These SUDs are maintained via the planning process.
- In Norway there are recommendations on how to improve operation of gully pots along roads.

At a **regional scale**

- Belgium reports connected to WWTP and they focus on reducing overflows in all, not concentrated on litter. Connected to surface waters they focus on maintenance of ditches and infiltration infrastructure (regional – local).
- There are several collaborations in Sweden, in the form that the plan is being developed by local water- and wastewater chiefs within the region, which then affects several municipalities within a larger area of connection.
- For UK all SUDS systems should have a litter picking regime as part of the maintenance arrangements for the systems. In addition, design features such as a hydro brake/trash screen can be utilized to capture litter that may get into the system. The road authority in NI (Northern Ireland) has a policy to implement the NI long-term Water Strategy which promotes the use of sustainable drainage design to separate storm water run-off from new roads, where practicable.
- In Ireland, there are local authority linkages to action groups, cleaning streets, litter bins, recycling facilities, green and brown bins, technology monitoring how full a bin is, the fat bin, local awards for tidiness, tourist area groups, etc.
- In Norway the county governor, as pollution control authority, can require treatment actions.

At a **local scale**

- Belgium undertake maintenance of infrastructure (ditches and infiltration installations) and waste removal from surfaces connected on separated systems (public and private).
- In Ireland, local watches, individual complaints, neighbourhood groups, individual warnings, littering penalties and enforcement, local catch pits, grills, recycle centres, splitting up rubbish, introducing screens and appropriate cleaning routines.
- Sweden have a few local stormwater plans. However, there are more common with other plans that include the issue of stormwater, e.g. blue-plans, green-plans, water and wastewater plans and water plans. Locally, there are several good examples of high

stormwater-actions-ambitions being taken. One example is NODRA, who in collaboration with the relevant parts of the municipality, has produced an action plan for stormwater where priorities have been set and a timetable established over what is assessed to be the right measure in the right place. Follow-up is required before the Swedish EPA can comment on how effective the actions have been.

- The activities and measures mentioned above for UK are carried out at a local level, within each development having individual arrangements in place.
- In Norway road owners are responsible for any polluted run-off from roads.
- Denmark report no more/new plans to minimize emissions of litter via stormwater at the national, regional or local scales than the ones that are already in place.
- Portugal report no plans but they do work with environmental education activities.

8. How the issue of storm water is considered within country/region

Stormwater management is generally considered at a catchment or regional (within country) level for OSPAR Contracting Parties, rather than managed nationally. Highlights of the responses received for each Contracting Party are listed below:

- Belgium reports that the issue becomes more and more important, that in Flanders 85% of the wastewater is treated on a WWTP, meaning the importance of overflows is increasing. Belgium want to address problems of drought and flooding by dealing in an adequate way with storm water.
- In Denmark the municipalities give the discharge permits to the stormwater and the state checks the compliance of the storm water outlet.
- In Germany it is the competence of the federal states, partly local requirements, and the German waste water ordinance is under discussion to fix national minimum standards.
- In Iceland, work is led by local governments.
- In Ireland a mixed response was given, with respondents saying work was led locally, regionally, nationally and by catchment.
- In Norway storm water management is both a local and regional issue. Treatment requirements are set in relation to water quality objectives in the water directive. Improved river management is also frequently part of the sustainable urban drainage systems.
- In the Netherlands the issue is considered within National policy with local implementation.
- Local authorities in Spain are in charge of wastewater treatment. However, most of these infrastructures are funded by the National or Regional Governments. This situation makes it difficult to perform an effective monitoring of these systems, so the previously mentioned legal regulation in progress is much needed and might derive in a better knowledge of the real importance of storm water events in our systems. The Royal Decree 1290/2012 establishes that water authorities must count on a complete register of the

storm water events with measurement systems to quantify the discharge into the receiving waters.

- Sweden's implementation of the Water Directive entails the establishment of regional authorities, the Water Authority, which establish cyclic action programs for river basins. There is stormwater management included as a measure.
- In UK the management of surface water in terms of quantity and flow is managed at a catchment level and crosses political boundaries in terms of the management of flood risk. However, from a qualitative point of view, this is regulated at a national level under CAR regime, with SEPA designated as the regulator in terms of control of the compliance, to manage water pollution. National policy and guidance have been produced and this filters down to all levels - the catchment area approach is also taken by the Department of Agriculture, Environment and Rural Affairs who are primarily responsible for policy development in this area. A cooperative and coordinated approach would be taken with the relevant authorities in ROI to ensure that management of this would cross political boundaries if necessary. Responsibility for stormwater in Northern Ireland is shared across a number of public bodies including DfI Roads, DfI Rivers and Northern Ireland Water (NI Water) which is a government-owned company. Riparian landowners also have responsibility for private drains. Northern Ireland also has a cross-departmental Stormwater Management Group jointly led by the Department of Agriculture, Environment and Rural Affairs and the Department for Infrastructure. The aim of the group is to examine a range of approaches to develop more integrated stormwater management in Northern Ireland by identifying and developing the legislative mechanisms and key policies required to deliver and implement sustainable stormwater management in Northern Ireland.

9. Existing laws or regulations, which determine how storm water is considered within each country

Many Contracting Parties provided reference to existing national laws and regulations, many of which relate to the EU Directives on Urban Waste Water Treatment and the Water Framework Directive. Highlights of the responses received for each Contracting Party are listed below:

- In Denmark sedimentation practices is considered to be in compliance with BAT. All municipalities should have a plan that considers climate change and flood.
- Iceland have implemented the EU directive 91/271/EEC concerning urban waste water treatment and are working on improvements in the implementation. Municipalities are required to have separate systems for storm water and domestic waste water. Improvements on older system are slow. Quality targets specifically for storm water are not available.
- In Ireland, there were mixed responses, with some respondents pointing to Irish regional strategies, or nationally implemented acts (Arterial Drainage (Amendment) Act, 1995, and Sustainable Drainage Systems (SuDS) and Integrated Constructed Wetlands (ICW)) and others referring to EU directives (the Flood directive, the Water Framework Directive).

- Regulations are implementing the EU Water Framework Directive in Norway.
- In Spain there is Royal Decree 1290/2012 which establishes that water authorities must count on a complete register of the storm water events with measurement systems to quantify the discharge into the receiving waters.
- In Sweden Lag (2006:412) om allmänna vattentjänster regulate discharge of public stormwater.
- In UK treatment of stormwater is regulated under the Controlled Activities Regulations in Scotland. Under Controlled Activities Regulations 2006 no treatment/SuDS is required if stormwater is discharged to Coastal Waters, unless the receiving coastal waters is designated as a Bathing Waters, Shellfish, etc. Building Standards makes reference to the CIRIA Manual. In relation to SEPAs responsibility they use several legislative powers depending on the collection system. i.e if its separate or combined. The Water Environment (Controlled Activities) (Scotland) Regulation 2011 (as amended) details GBR10 deals with the discharge of surface water run-off from a surface water drainage system to the water environment from various developments. It also regulates under license any larger sites which require more control of surface water. For combined collection they regulate under the Urban Waste Water Treatment Directive 1991 (UWWTD) for discharges from the collection system and use the controls for sewage debris with regards to screening all flows up to a 1 in 5 storm events for new or unsatisfactory discharges. In 2016, the Northern Ireland Assembly introduced new legislation regarding new connections to the public sewer network. This provided NI Water with the power to refuse a surface water connection if an alternative means of dealing with surface water has not been considered. These alternatives can include landscaping, natural and green features. In essence, it encourages anyone seeking a new stormwater connection to introduce a means of controlling or slowing down the release of water, or implementing a Sustainable Drainage System (SuDS) to ensure a connection. The use of SuDS in new developments is also promoted as the preferred approach under the subject policy Planning and Flood Risk contained within the Strategic Planning Policy Statement for Northern Ireland (SPPS).
- Portugal and Germany have no existing laws or regulations which determine how storm water is considered within the country, and in Belgium and the Netherlands no answer was supplied.

Annex 1

Responses were received from the following institutions

Contracting Party	Institution name	Organisation type
Belgium	Vlaamse Milieumaatschappij	National Government / Governmental Institution / Agency
Denmark	Miljøstyrelsen (Danish Environmental Protection Agency)	National Government / Governmental Institution / Agency
Germany	Umweltbundesamt – German environment agency	National Government / Governmental Institution / Agency
Iceland	Environment Agency of Iceland	National Government / Governmental Institution / Agency
Ireland	South Dublin County Council	Local Government Institution
Ireland	Wexford County Council	Local Government Institution
Ireland	Donegal County Council	Local Government Institution
Ireland	Westmeath county council	Local Government Institution
Ireland	Laois County Council	Local Government Institution
Ireland	Laois County Council	Local Government Institution
Ireland	Longford County Council	Local Government Institution
Ireland	Dun Laoghaire Rathdown County Council	Local Government Institution
Ireland	Dublin City Council	Local Government Institution
Ireland	Cork County Council	Local Government Institution
Ireland	Cavan County Council	Local Government Institution
Ireland	Waterford City and County Council	Local Government Institution
Ireland	Louth Co. Council	Local Government Institution
Ireland	Cork County Council	Local Government Institution
Norway	Norwegian Environment Agency	National Government / Governmental Institution / Agency
Portugal	Câmara Municipal de Viana de Castelo	Local Government Institution
Portugal	Câmara Municipal de Ovar	Local Government Institution
Spain	Ministry for the Ecological Transition.	National Government / Governmental Institution / Agency
Sweden	Swedish Environmental Protection Agency	National Government / Governmental Institution / Agency
The Netherlands	Netherlands Ministery of Infrastructure and Watermanagement	National Government / Governmental Institution / Agency
The Netherlands	Ministry of Infrastructure and Water management	National Government / Governmental Institution / Agency
UK	Scottish Water	Other
UK	Department of Infrastructure - Roads	National Government / Governmental Institution / Agency
UK	Scottish Environment Protection Agency	National Government / Governmental Institution / Agency
UK	East Dunbartonshire Council	Local Government Institution
UK	Department for Infrastructure	National Government / Governmental Institution / Agency