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Marine Conservation Society's response to the consultation on expanding the Storm Overflows Discharge Reduction Plan to include coastal and estuarine waters

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1. Should the government explore developing an ecological standard for coastal and estuarine waters?

Yes. The development of an ecological standard for the coastal and estuarine waters would be welcome to understand the impact human activities, including stormwater discharges, are having on the marine environment. However, the standard should take into account the considerable unknowns around emerging pollutants, and should not be based solely on known pollutants that may or may not have an ecological impact as present. Put another way, the standard should be future-proof and should be underpinned by the precautionary principle (which is one of the core principles now set out in the Government's Environmental principles policy statement) when it comes to considering the impact of emerging pollutants.

Pollution, both chemical and plastic, is considered one of the key drivers of the biodiversity crisis and novel entities have been shown to exceed the safe operating space for the planetary boundaries model. We are already operating unsafely when it comes to emerging contaminants, therefore adding more through sewage spills will inevitably cause harm. Furthermore, if the Government is going to show evidence that it is achieving the requirements under the Habitats Directive, then monitoring of pollutants via an ecological standard is essential.

Under the Habitats Directive, listed species and habitats (and the typical species of those habitats) need to recover to or be maintained at favourable conservation status under statute. If water quality affects the features of the site to an extent that it curtails their ability to feed/breed/respire effectively, then that activity should be managed. For example, poor water quality can have deleterious effects on reproduction of cetaceans (biomagnification) and can damage the ability of marine plants (such as seagrass) to photosynthesise efficiently. Moreover, excessive nutrient input to enclosed and semi-enclosed seas can lead to blooms of ephemeral filamentous green algae that can outcompete vital fish nurseries and seagrass beds.

However, it should be emphasised that such a standard would always be looking at harm retrospectively. For example, if the standard showed harm, clean up would be next to impossible. In any event, the government and its agencies have a poor track record of

holding water companies to account and are significantly under-resourced. As a November 2011 ministerial submission disclosed in the High Court as part of recent legal proceedings noted: "*Due to the likely scale of the issue, the Environment Agency nor Ofwat will not be sufficiently resourced to fully investigate all breaches of permits or related legal obligations.*" Consequently, prevention rather than clean-up has to be the primary aim.

Despite these challenges, only by monitoring can we understand the impact of human activities. Therefore, rather than simply 'exploring' the development of an ecological standard for coastal waters, the government should fully commit to doing so. If it does not do so for any reason, we would expect the government to set out its justification both in policy terms and in ecological terms.

2. What considerations do you think may be relevant to developing an ecology standard for

a) coastal overflows and b) estuarine overflows? Please make reference to any specific types of harm that you believe should be taken into account.

As an overall point, the original plan's adoption of a definition of "no adverse ecological impact" that can only be applied to freshwater sites was a severe limitation on the effectiveness of the Plan, and as we set out in our High Court claim, we considered them to be unlawful by reason of irrationality.

Every spill from stormwater overflows and Emergency overflows contains pollutants. We recognise that wastewater treatment processes were not designed to remove certain contaminants—for example, microplastics—but these processes are *de facto* incredibly effective, removing up to 99% by capturing it within the sludge.

A recent publication from the Chemical Investigation Programme has suggested that a lower treatment level could be applied to stormwater overflows[1]. We are very concerned that this provides a loophole to grant a lower level of protection for the environment to reduce costs, especially if monitoring only includes those contaminants the treatment specifically targeted.

Therefore, regardless of what is monitored, the number of spills (and their volume) will be a notable source of pollution. The critical point to note is that no discharge will be free from causing environmental harm. The standard should be used to monitor these discharges and understand the impact they are having on the marine environment, rather than using the standard to justify discharges under the guise of having no environmental impact.

The ecological standard should be used in conjunction with a spill metric which would need to include volume (as previously recommended by the Environmental Audit

[1] UKWIR Technical Report: Treatment Options for Storm Overflows

Committee)[2], since for example a spill from a "super" sewer would likely have a much higher impact that a spill from storm overflow connected to a hamlet even if they have the same duration. We recognise that volume does not necessarily have a linear relationship with harm, however if coupled with monitoring, a clear understanding of the chemical pollutants being discharged and their accumulation over time could be recorded. This is currently a major gap in the way the impact of sewage discharges is monitored and understood.

There is also a need to develop more targeted monitoring. The estuarine environment is likely to require specific monitoring of nutrients alongside other parameters measured in the freshwater environment, in addition to persistent chemicals. In the marine environment where there is constrained water flow, for example, in bays and inlets- nutrient runoff may be significant. This is also true for areas where there are very acute levels. However, beyond this, persistent chemicals and microplastics are likely to be the main driver of ecological harm. Therefore, our response in this question applies to both coastal and estuarine overflows.

We have noted that recent publication "Treatment Options for Storm Overflows" by the Chemical Investigation Programme specified harm as having been defined "in two ways within the Plan, first in harm to public health and the presence of pathogens. The second is harm to the environment, specifically ecological harm due to the impact of storm overflows on water chemistry. Organic pollutants, microplastics, pharmaceuticals, nutrients, metals and visible litter are named as parameters contributing to ecological harm"[1]. We welcome this assessment by the Chemical Investigation Programme of these widespread contributing parameters.

This, we understand, been supported by other Government agencies. For example, we understand that that Respondents to the original consultation – which included organisations like the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) also proposed that the definition should extend beyond ammonia and dissolved oxygen indicators to include a wider suite of key chemical groups of concern.[3] We strongly agree, and consider that this would allow for a more complete assessment of adverse impacts.

Recent in-situ analysis by Dr. Alex Ford and his team as part of Project Spotlight[4] run by the Clean Harbours Partnership has shown high levels of contaminants in the marine environment including those known to be present in sewage, including contaminants known to have a negative impact on marine biota. We highlight that many of these will include chemicals for which the impact on the marine environment has not been fully studied. However, we should apply the precautionary approach to highly persistent pollutants whether that is chemicals or plastics.

[2] Environmental Audit Committee report: Water quality in rivers
[3] That said, we note that the Government's consultation response responds only to consultees who felt the definition should "include a wider suite of key chemical groups". That does not address the point that the adopted definition cannot be used at all in the marine environment.
[4] Portsmouth University: More than 50 chemicals discovered in water...

For an ecological standard, scientific research has shown that not only acute impacts should be considered, but also those which build up over time through persistent chemicals. When the standards currently used for sewage discharge monitoring in rivers were developed, this understanding was in its infancy. In addition, the build-up of persistent chemicals is typically less prevalent in freshwater due to shorter lifespan of the organisms.

For some pollutants with bioaccumulative and/or persistent properties, the levels in the marine environment and wildlife are potentially higher and of greater concern than the same pollutants in freshwater. The most dramatic illustration of this is the fact that levels of some synthetic chemicals (i.e. PCBs, PBDEs) are higher in the deepest part of the ocean, the Mariana trench, than they are in some of the most industrialised areas in the globe[5]. It is generally the case that persistent and bioaccumulative pollutants affect the animals at the top of the food chain the most due to biomagnification. The animals that mature late and have fewer offspring tend to have a larger build-up of contaminants. Studies have shown that there have been no new calves in the UK killer whale population in decades, and this has been linked to severe PCB pollution.

There is ample data presenting the harm from legacy persistent pollutants, but for many emerging persistent contaminants, impacts are not fully understood. However, due to the nature of persistent pollutants, building up with repeated release will ultimately increase the likelihood of reaching the tipping point where harm is caused. Alongside this, the impacts from persistent pollutants will be irreversible due to their long-lived nature and inability to remove them from the environment, after the pollution incident.

If the standard is being used to confirm 'no adverse ecological impact' then it must consider the mixture effect, whereby exposure to mixtures of individual chemicals at levels considered safe can trigger adverse effects. In the real-world, aquatic wildlife is exposed to complex mixtures of known and unknown natural and anthropogenic substances. There is an increasing amount of evidence showing that the toxicity of a mixture of chemicals is not equal to the sum of its parts, and most worryingly, that mixture toxicity could happen at levels below the toxicity of the individual single chemicals. It is becoming widely accepted that you should apply a Mixture Assessment Factor (MAF) to take account for this. This would lower the levels at which the chemicals are considered to cause no ecological harm.

The methodology used for the Stantec Storm Overflow Evidence Project (SOEP) is also of note given it underpinned the original SODRP. Various documents refer to this methodology. For instance, page 121 of the original Impact Assessment accompanying the original SODRP states that: "*Discharges from storm overflows carry other pollutants not considered in this research, such as microplastics, metals, hydrocarbons, and nutrients. The impact of these pollutants is chronic (builds up over time) whilst this research's assessment of river health is focused on the acute (short-lived) impacts of recurring low*

[5] Nature: bioaccumulation of persistent organic pollutants in the deepest ocean fauna

oxygen and high ammonia known to be toxic to aquatic life and the basis on which storm overflow have been managed historically". The SOEP itself states on page 3.23 that: "*Some of the scenarios using SuDS [Sustainable Urban Drainage Systems] could contribute to reducing the load from other pollutants, but this has not been accounted for in the benefit calculations*". As this statement acknowledges, many pollutants found in storm overflow discharges are persistent. Not considering the impact of persistent pollutants on aquatic life fails to paint a full picture of potential harm caused by discharges.

Emerging chemicals, keeping up to date, and the importance of monitoring

In creating an ecological standard, the presence and impact of emerging chemicals of concern needs to be considered. The UKWIR Chemicals Investigation Programme has made good progress in collating information about several emerging chemicals in different parts of wastewater treatment. This should be taken as a starting point for monitoring. This ecological standard must also be reviewed on a regular basis (every five years, in line with the Price Review process), to ensure that the list of emerging chemicals of concern and risks from other contaminants are kept up to date.

Monitoring is often constrained by time and money, meaning that traditional standards are used, such as those for nutrients. However, modern day pollutants with known harm are much more diverse including microplastics, PFAS, flame retardants, pharmaceuticals, pesticides, and endocrine disrupting chemicals to name a few. These should be included in monitoring. There is often a lack of using updated evidence to inform what should be monitored. Therefore, impact is often based on a small set of legacy chemicals that doesn't represent the true picture of contamination. This has been shown previously with the addition of legacy persistent chemicals (PFOS and PBDE's) to the WFD monitoring regime, which ultimately changed the outcome of 97% passing to 100% failure in Good Chemical Status. This example highlights the importance of monitoring for relevant chemicals and not relying on outdated, limited lists of contaminants.

Where modelling is used, this is seen as an adjunct to examining adverse ecological harm, and should not be used as the assessment tool i.e., routine monitoring should be used to confirm that the model is still relevant and up to date or whether in fact it requires updating or improvements.

Influent into the sewage treatment works has been shown, through the most recent Chemical Investigation Programme (CIP 3), to contain the chemical DBDPE (decabromodiphenylethane), a commonly used flame retardant, in exceedance of PNEC (Predicted No Effect Concentration). DBDPE has been shown to evoke reproductive endocrine disruption in marine mussels and has also been found in the livers of harbour seals. For Marine Protected Areas it would be important to show that chemicals would not have any deleterious effects in order to comply with the Habitat Directive which requires no deterioration of the typical species. As DEFRA noted during the consultation on

environmental targets under the Environment Act 2021[6]: "*We are now focussed on ensuring these sites have the required management measures in place to reduce the impact of potentially damaging activities and improve the MPA network's condition.*"

Biodiversity targets within that consultation (page 15) state that, "*Recoverability assessments categorise biotopes, habitats or species, based on their resistance (ability to withstand) and resilience (ability to recover after) pressures caused by human activities. A resilience category is then assigned which gives a timeframe in which the recovery of a feature is expected after the pressure is removed.*" Later on page 15, the same document states that, "*Each feature has a number of defined attributes, which are used to assess the health of that feature (such as extent, distribution, structure, function and supporting processes, e.g. water quality).*" Therefore, on top of the monitoring needed for pollution and water quality, part of the ecological standard must also include monitoring to show progress to halt species decline.

Similarly, the Marine and Coastal Access Act (2009) requires that features within the site recover to or are maintained at favourable conservation status. Poor water quality can be damaging at many levels of the food chain – through filter feeding organisms that affect the animals through direct consumption of the water body and particles within it (e.g., native oyster populations), to the biomagnification of heavy metal and other chemicals in the tissues of long-lived top predators up the food chain.

Government would have to ensure that poor water quality doesn't affect the large harbour porpoise sites we have around UK seas, and the status of those species - be that in sub-lethal impacts (e.g., on reproductive output) or in aspects of brain function. MPAs will not achieve Favourable Conservation Status (defined by Natural England as "the situation in which a habitat or species is thriving throughout its natural range and is expected to continue to thrive in the future"[7]) with these effects deleteriously affecting large parts of the food chain. Such risks will reduce the government's own Environment Act targets of restoring 70% of features of the MPA network by 2042. We have given some examples below of likely impacts:

- **DBDPE** (flame retardant) reproductive endocrine disruption in marine mussels, and hormonal affects in zebrafish. Also the chemical has been found in the livers of harbour seals
- **Fipronil** (pesticide) brown shrimp impact showing behavioural changes and body colour changes.
- **Imidacloprid** (insecticide) has been shown to impact the immune system of Sydney rock oysters. It is also likely to impact other molluscs, as evidenced by the quote lifted from this paper: "*This means that contamination of aquatic systems by neonicotinoids could have significant implications for commercial molluscs (e.g., oysters, scallops, mussels and clams), threatening productivity.*"

[6] Defra consultation on environmental targets
[7] Natural England

- **BPA** (plasticiser) has been shown to reduce the immune response and lower survival rates in blood clams, as detailed in this paper. BPA is also known to impact fish reproduction by via oestrogen receptors, but many studies advocate that BPA affects almost all aspects of fish physiology.

Dilution and exposure

The argument that due to the vastness of the ocean, contaminants are diluted to the point of no harm, is an outdated argument that is not based on current evidence. We are therefore surprised to see it repeated across various documents published by the Government. There are a few obvious points to stress here:

- The ecological harm from persistent contaminants is not rectified by dilution. For one, if their release is continued, the levels in the environment will continue to build up, regardless of dilution, and the level at which harm is caused will still be reached eventually.
- Furthermore, some persistent pollutants (PFAS) have been shown to be significantly concentrated on sea spray and ultimately transported back to shore, further contaminating other water sources.
- With bio-accumulative contaminants, repeated exposure for wildlife will lead to more accumulation, increasing the likelihood of impact. As an example of the impacts of bioaccumulative chemicals, a Scottish study of grey seal pups showed that at only 18 days old, they had already accumulated enough Persistent Organic Pollutants (POPs) to impact their blubber function and ultimately their ability to survive.

Therefore, we do not believe that **any** discharge will be free from causing adverse ecological harm due to the presence of bioaccumulative and persistent pollutants. The prospect of dilution is not a realistic one, and not supported by any scientific evidence.

Persistence

When developing an ecological standard, key consideration needs to be given to persistent contaminants. Many of these contaminants are already ubiquitous in the environment and further adding to them through sewage discharges will increase the potential harm they will cause. The pollution from these persistent contaminants is also often completely irreversible, therefore the impact will be felt for generations. When considering ecological harm, it is not sufficient to think about the immediate acute impact but also the harm caused by a build-up and repeated exposure to chemicals.

Chemicals such as PFAS (per- and polyfluoroalkyl substances) are used extensively in industrial and consumer uses, including items that are destined for wastewater treatment e.g., cosmetics, cleaning products, waterproof coatings etc. It is therefore essential that these chemicals are included in monitoring around stormwater discharges, and in the development of an ecological standard.

Chemicals that are persistent and remain in the environment without breaking down build up in wildlife, biomagnifying in larger longer-lived animals and even passing trans generationally. Therefore, they have an impact at a population level. Animal young are being born pre-polluted with PFAS and in some instances, persistent chemicals have caused reproductive impairments, ultimately limiting future generations of species. Because of the inevitable population harm, the precautionary principle must be followed when it comes to persistent contaminants in discharges.

Once again, on the dilution point, any notion that because of the vastness of the ocean, PFAS might be diluted to a point where no harm is caused is incorrect and a misconception. In fact, some PFAS have been shown to be significantly concentrated on sea spray and ultimately transported back to shore, further contaminating other water sources.

What is local?

We found the use of the phrase 'local' in the consultation confusing. We agree that sampling of discharges must be undertaken locally, as close to the stormwater overflow as possible. However, there must also be acknowledgement that the impact from the discharge will not be limited to the local environment and should instead be assumed that the wider environment will also be negatively impacted. Some persistent chemicals such as PFAS are highly mobile and have the potential to travel great distances, ultimately impacting the entire environment. PFAS have been found at high levels in arctic ice[8] and more recent research has shown that the English Channel specifically is a key source of PFAS pollution to the wider Atlantic Ocean[9].

Marine litter

We highlight that the UK is contracting party under OSPAR and the threshold of 20 items per 100m is being widely used in analyses as a target[10] (under EU Marine Strategy Framework Directive this is the threshold defined as meeting Good Environment Status). Currently, utilising an average over the last 10 years, Sewage Related Debris (SRD) accounts for 3% using data collected by the Marine Conservation Society. Using this as a baseline, SRD which mostly consists of plastic (a persistent pollutant) should be result in less than 1 item found per 100m. This should be incorporated into the ecological standard as compiling with current best practise.

Lack of evidence does not mean lack of impact

As an overall point, it is imperative to understand that a lack of evidence does not mean a lack of impact. The marine environment and key habitats for crucial species are still being discovered even within shallow waters around the UK[11] (for example, a new flame shell reef was discovered in the shallow waters of the South Arran MPA by divers, and Cornwall IFCA

[8] Levels and distribution profiles of Per- and Polyfluoroalkyl Substances (PFAS) in a high Arctic Svalbard ice core
[9] Horizontal and Vertical Distribution of Perfluoroalkyl Acids (PFAAs) in the Water Column of the Atlantic Ocean
[10] Scottish government blog: monitoring plastic beach litter
[11] Cornwall Wildlife Trust

with Cornwall Wildlife Trusts discovered new range extensions of seagrass beds of shallow bays in St Austell and Mounts Bay. It is essential we secure the protection of these most important habitats for biodiversity and buffering the impacts of climate change. We are concerned that it is in water companies' interests to limit to the scope of the monitoring to both reduce costs and to reduce recorded impact. We therefore need any new standard to incorporate the widest sampling regime including persistent chemicals.

3. Should any other areas be added to the current list of high priority sites in the Plan?

We think that all Marine Protected Areas should be included. On the Government's own terms as set out in the consultation papers, these would include:

- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)
- Marine Conservation Zones (MCZs) and Nature Conservation Marine Protected Areas
- Sites of Special Scientific Interest (SSSIs)
- Areas of Special Scientific Interest (ASSIs)
- Ramsar sites

For context, our analysis of 2022 data suggests that there are:

- 1639 overflows discharging within 1 kilometre of MPAs
- 899 overflows discharging into coastal/transitional waters, but not within 1km of an MPA
- 115 of the 899 have a monitoring requirement for bathing waters listed

4. Should all overflows, including those discharging into coastal and estuarine waters, be included in the scope of the Storm Overflows Discharge Reduction Plan?

Yes. This was a key point raised in our High Court claim challenging the original SODRP – and has led to this consultation process. Our position is that it would be irrational (in legal terms) for overflows into coastal and estuarine waters to be excluded from the scope of the revised Plan, as it was when they were excluded from the original Plan.For one, coastal discharges shouldn't be excluded due to the reason of dilution for the reasons set out above. As outlined in question 2, contaminants in sewage such as forever chemicals and microplastics are highly persistent and accumulate in the environment. Once they are released into the environment, it's practically impossible to remove them. If they continue to accumulate, they will eventually pass—or may already have passed—a threshold of harm.

To reiterate, the idea that the vastness of the ocean eliminates harm due to dilution is a misconception. Persistent chemicals phased out decades ago are still causing severe adverse effects to marine life. Furthermore, for some persistent, bioaccumulative pollutants, the concentrations are higher and potentially of greater concern in the marine environment than in freshwater.

While additional protections are afforded to coastal bathing waters, in practice, these aren't the only locations where people enter the water. To reduce the impact of sewage spills on human health, all overflows (including those discharging into coastal and estuarine waters) should be included in the scope of the Plan.