



Strandliners
Cleaner Rivers, Cleaner Seas

Bio-beads in Rother District

Foreword

“Bio-beads may have been in use for around 30 years as part of the infrastructure used by water companies to provide clean water for large populations in the U.K, but it is only relatively recently that their presence has been increasingly recorded as lost into the environment. Back in 2012 I took photographs at Camber Sands of what I thought were nurdles (pre-production pellets that have a history of being lost to the environment for 40/50 years), not knowing that these were in fact some of the first record of bio-beads in the south east English coastline.

It took research by the Cornish Plastic Pollution Coalition and FIDRA to confirm major losses of bio-beads along the south coast of England, but still there has not been much research into the specific sources, and it seems that major organisations have not been able to shed much light either.

The presence of bio-beads in quantities at Camber Sands and Cuckmere Haven was one reason why Strandliners was founded, to engage the public to identify and record plastic pollution found in our communities, and I am really grateful that Garazi Monzo-Contreras has been able to fill in a lot of gaps around the presence of bio-beads at Camber Sands, with the support of Kristina Sodomkova and colleagues at Rother District Council. We should all praise the foresight of the Rother District Council being proactive in the publication of this report, where other organisations will be able to follow.”

Andy Dinsdale, Executive Director, [Strandliners](#) - Increasing public awareness of our environment through citizen science & community engagement

“I should like to thank Garazi for allowing me to participate in this project albeit in a very small way. Firstly, it highlights the benefits of working across different local authority departments, with educational establishments and voluntary public interest groups such as Strandliners. Secondly it has raised our awareness of the presence of bio-beads in the aquatic environment. Both I and my environmental health colleagues were unaware of the existence and use of bio-beads in the sewage treatment process before our involvement in the project. While Rother Environmental Health function does not have regulatory responsibility for the use of bio-beads or their subsequent release into the environment, Garazi’s project has highlighted deficiencies in the current UK environmental permitting regime and its application in relation to the release of plastics materials into our controlled waters.”

Steve Biggs, Senior Environmental Health Officer, Rother District Council

“This report is a testament to the value of a local authority engaging with a higher education institution. Involving students as part of their MSc placements generates new knowledge and insights a local authority would otherwise be unlikely be able to produce. An MSc placement set up as a collaborative activity benefits the student and offers a unique opportunity for partners engagement, bringing together a diverse group of experts and enthusiasts. Such partnership approach is at the heart of the [Rother’s Environment Strategy](#) and its delivery. Students are our future and any support we can lend them on their professional journey in these testing times is a worthwhile offering.”

Dr Kristina Sodomkova, Environment and Policy Manager, Rother District Council

Acknowledgements

I want to firstly thank the opportunity to be a part of such an amazing project to Dr Kristina Sodomkova, the Environment Strategy's lead at Rother District Council, and my direct supervisor that spent so much time organising this project.

Secondly, I would like to thank Andy Dinsdale, Director and Founder of Strandliners CIC, who taught me everything I know on bio-beads and nurdles, showed me surveying techniques, gave me a few lifts to surveying locations and shared his passion for a plastic free environment.

I would also like to thank Steve Biggs, Senior Environmental Health Officer from the Community Protection Team department in Rother District Council, who collaborated on the project. Steve was always willing to join our data collection trips and used his contacts to acquire key documents to support this study.

The Coastal Officers of Rother District Council also played a key role in this project. Sam Stone, Stuart Lawson, and Skye Curtis have provided me with key information on the pollution incidents at Camber Sands. I am grateful for their input.

Last but not least, I would like to give a big thank you to the Green Growth platform and the University of Brighton for making this placement possible, specially to Dr Helen Walker, the module leader, and Dr Ryan Woodard, the program leader, for linking me to Rother District Council and for giving me moral support.

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Abstract

The (2018) Cornish report by the Cornish Plastic Pollution Coalition suggested that Cornwall and the English Channel coast are major hotspots for bio-bead pollution within the UK. This Rother District report, commissioned by the local authority under the auspices of its Environment Strategy's delivery and produced as part of an MSc placement at University Brighton, confirms that a key coastal area around Camber Sands in the eastern part of the district is indeed a bio-beads hotspot, with two major bio-beads pollution incidents reported to the environmental regulator, the Environment Agency, (in years 2010 and 2017).

Moreover, the project has uncovered a low-level leakage of bio-beads into the natural environment inland at Beckley Water Treatment Works in the eastern part of the Rother District where bio-beads (also called BAFF media or Brightwater), small plastic pellets, are used as part of the wastewater treatment process.

With bio-beads, prevention is better than cure. In fact, there is no cure so far as such. Bio-beads are still present at Camber Sands to this day, after the 2010 and 2017 reported pollution incidents. Bio-beads pose a risk to the natural environment due to their perceived toxicity as well as size and light weight which means they travel large distances and the source is difficult to track down.

This inability to pinpoint who the polluter is means there is a lack of incentive for water companies to improve their management practice when it comes to handling and storing bio-beads and when it comes to introducing adequate containment measures and new technologies in replacement of the BAFF systems. Southern Water, as the Chair of the Sussex Local Nature Partnership and sitting on the East Sussex Environment Board, should be an exemplar environmental leader when it comes to its principles and practices. Within its operational area, the Water Treatment Works at Eastbourne require scrutiny, due to inconsistencies of data provided about past pollution incidents and the poor accessibility of the site for staff.

Worryingly, the Environment Agency seems to have lacked expertise and was ill-equipped dealing with bio-beads pollution incidents in the Rother District. The environmental regulator must grasp the magnitude of the threat bio-beads pose to the natural environment if future major incidents were to occur again. It is hoped this report will serve as a useful wake up call for the regulator to take this issue very seriously.

Overall, there is a need to raise awareness of the bio-bead problematic amongst various audiences and this is what the report hopes to achieve. It contains several recommendations. The bio-beads research is in early stages and there are many unanswered questions. This report aims to contribute to evidence-based approach out there, building on the work of the Cornish Plastic Pollution Coalition.

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Introduction

This report contains information about the presence of bio-beads in the Rother District – the first time such information has been collated. The report is the output of an MSc student placement, hosted by Rother District Council as part of its Environment Strategy's¹ programme. The placement investigated presence of bio-beads within the Rother District. As well as collating evidence from various sources, the purpose of the report is to raise awareness of bio-beads amongst the public and the local communities to effect positive environmental change.

The following sections of the report introduces bio-beads: what they are, where they come from and why should we be concerned about them. The regulatory and legislative framework for bio-beads is also outlined.

What exactly are bio-beads?

Bio-beads are microplastics smaller than 5mm. Their appearance is wrinkled and ridged on the sides as shown in the photo in Figure 1. They are manufactured this way to induce bacteria attachment during the water treatment, to stimulate bacterial and fungal growth at their surface. Therefore bio-beads are exclusively used by water companies as part of the water treatment process. They are known as a type of biological aerated flooded filter (BAFF) media [1].



Figure 1 Bio-beads and a magnified image, showing distinct ridges. Source: Strandliners (2021).

¹ Rother Environment Strategy: <https://www.rother.gov.uk/strategies-policies-and-plans/environment-strategy/>

The European Urban Waste Water Treatment Directive of May 1991² required new effluent standards. The BAFF systems were considered to tackle those problems including space limitation and minimal environmental impact [2]. Apart from the high surface area to promote biomass growth [3], the use of bio-media has several advantages [4]:

- In the cleaning cycle no other sewage effluent is needed, which reduces the amount of material and devices needed for this step (water holding tanks, pumps, pipework, valves...).
- The air rate is higher than in other methods which removes the excess biomass from the media and allows the produced sludge to remain in a fixed volume.
- As an intense cleaning procedure, mud balls are avoided, letting the bio-beads move smoothly inside the BAFF tank.
- Bio-beads operate with a 6mm inlet ensuring removal of finely divided neutral buoyancy materials.
- Bio-beads perform several functions: carbonaceous removal and BOD (Biological Oxygen Demand) removal under saline conditions, ammonia removal and denitrification.
- They produce consistent, high quality effluent to a level of 5 mg/l BOD, 10 mg/l SS, 0.5 mg/l NH₃-N.

A bio-beads BAFF system was first introduced by Brightwater Engineering Ltd as an alternative to conventional Activated Sludge plants [2]. The company was then acquired by FLI Water Ltd³ who has been importing bio-beads from France from a company called imports them from a French company called Plasti-Negoce [1] which apparently dissolved 2016 [5] although a Facebook page bearing this name has been updated as far as 2020.⁴ The current suppliers of bio-beads in the UK have not been researched further as part of this MSc placement. According to the (2018) report by the Cornish Plastic Pollution Coalition, there were at least 55 water treatment plants in the UK using BAFF systems [1].

Bio-beads can easily be mistaken for nurdles, which are industrial plastic pellets used

²Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31991L0271>

³ FLI Water Ltd: <https://www.fliwater.com/>

⁴ [Facebook page](#)

to produce bigger plastic structures such as water bottles. Their appearance differs from bio-beads as they are smooth and have a regular shape. Fidra⁵ - an environmental organisation based in Scotland that is focused on reducing plastic waste and chemical pollution in our seas, on our beaches and in the wider environment - created the following identification chart, presented in Figure 2, as part of their event called 'The Great Nurdle Hunt'⁶. The pictorial chart helps to distinguish bio-beads from nurdles.

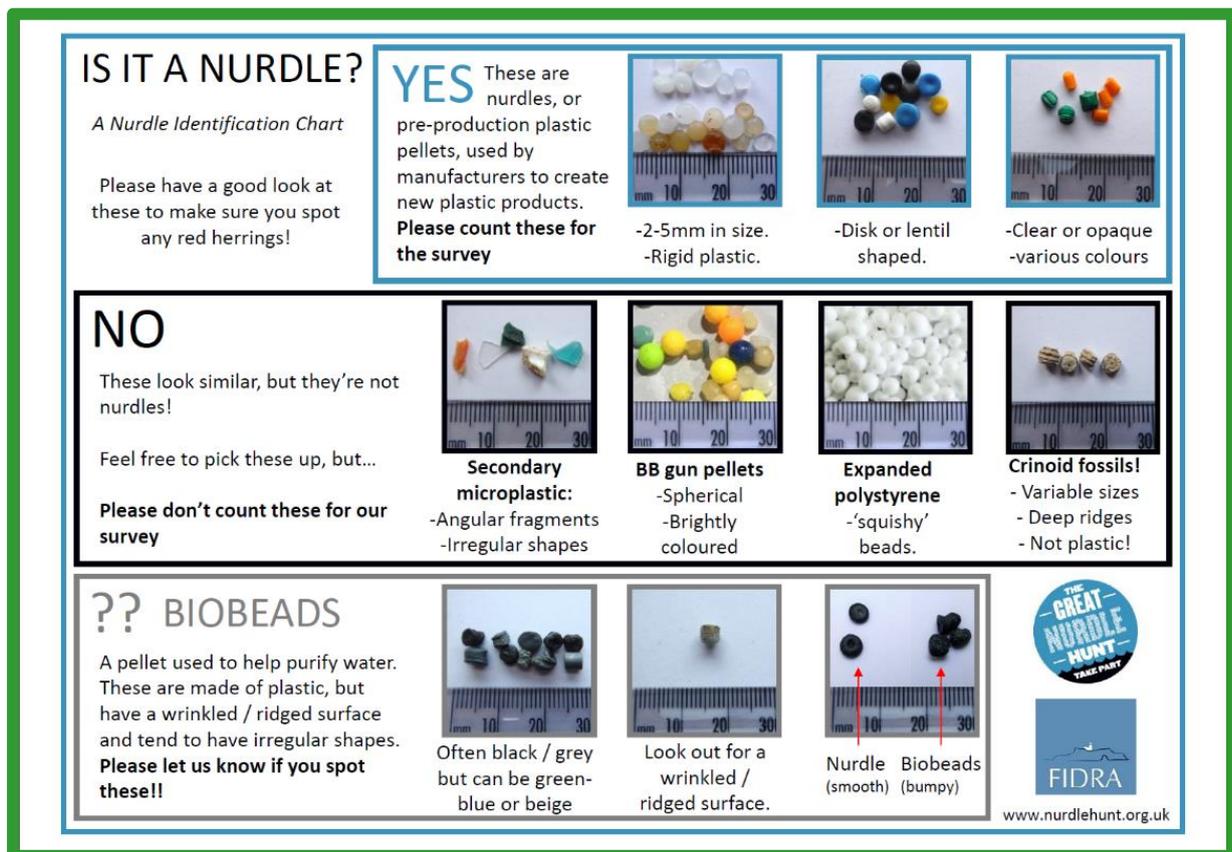


Figure 2 Figure 2 FIDRA's Nurdle identification chart. Source <https://www.fidra.org.uk/>

Why are bio-beads a problem?

There are multiple issues arising from bio-beads usage when these particles escape from a water treatment facility. Notably, it is to do with their toxicity and small size.

A comparative analysis done by Turner, Wallerstein [10] shows their toxicity as bio-beads contain a high number of polycyclic aromatic hydrocarbons (PAHs). However, the unused post-manufactured bio-beads are compliant with respect to corresponding

⁵ FIDRA: <https://www.fidra.org.uk>

⁶ The Great Nurdle Hunt: <https://www.nurdlehunt.org.uk/>

restriction of hazardous substances limits.

PAHs derive from burning hydrocarbons such as vehicle exhaust emissions, which suggests that exposure of bio-beads to PAHs during wastewater treatment causes plastic to absorb the contaminants, increasing their toxicity. PAHs have carcinogenic properties and are endocrine disruptors [11]. They are lipid soluble and are easily absorbed from the gastrointestinal tract [12] representing a danger to fish and birds, and consequently humans that consume them [13]. A study done by Teuten (2009) demonstrated that microscopic plastics transfers PAHs to organisms, in this case lungworms. After being exposed to contaminant-absorbed plastic for 10 days, the contaminant concentration in the tissue of the lungworm was higher than that in the plastic [14]. Bio-beads also contain significant levels of lead, antimony and bromine. Elements that are added as flame retardants in recycled electronic equipment [10].

Bio-beads shape and small size is a problem for birds and marine life as the particles can be mistaken by food.

The small size, light weight, and buoyancy properties of these beads makes it very difficult to control and contain them once their escape into the natural environment and trace their origin. Bio-beads are considered to travel long distances e.g. through natural processes such as longshore drift.

In 2010 there was a recorded spill in Cornwall on the Truro River in which an estimated 5.4 billion beads escaped and travelled through the English Channel before appearing on many beaches, including Camber Sands. The incident was reported in the new e.g. BBC (2018) article <https://www.bbc.co.uk/news/uk-england-devon-45524321>

Since 2010 bio-beads have been found in concentrations along the French coast, especially in Boulogne-sur-Mer where the NGO Robins des Bois measured 75 g of bio-beads per litre of sand [7]. They have also reached Netherlands' shores, with high amounts found in January 2018 [8] and April 2019 [9].

Greenpeace published a report in 2019 as a result of a study on microplastics in UK rivers. They state that 46% of the microplastics found were composed of Polyethylene, including bio-beads. They found bio-beads in the River Mersey (North West), the River Severn (Wales) and the River Aire (Yorkshire) [6].

UK legislation and Policy

The Environment Agency (EA) is the environmental regulator who sets out requirements for water and sewerage companies to report on water quality, including discharges from sewage treatment works. The Agency also categorises and reports on pollution incidents, and fines companies when they are not compliant.

The EA's corporate report Environment Agency: *EA2025 Creating a better place*⁷ acknowledges, under the priority *Healthy Air, Land, and Water*, "Many of our water bodies are in a fragile state" and continues to say: "New risks may be emerging from micro-plastics and chemicals introduced into the air we breathe, the water we drink and the food we eat."

The EA report *2021 River Basin Management Plan* [16], published in October 2019, speaks of bio-beads and of collaborative working with water companies to prevent the accidental loss of bio-beads from water treatment processes into the environment. The report states under heading 3.2.5 *Industry initiatives*: "Industry is developing and implementing best practice initiatives to reduce accidental release of small plastic beads used in treatment and cooling water processes: collaborative working with water companies to prevent the loss of plastic media from their treatment processes into the environment." The report does not mention which initiatives these are and what this collaborative work between the EA and the water companies involve.

In a written evidence to the UK parliament, dated December 2020⁸, under the question marked as 4 (What is the impact of plastic pollution and other materials on drainage and water quality in rivers and what should be done to mitigate it?), the EA offered this response:

⁷ EA2025 Creating a better place: <https://www.gov.uk/government/publications/environment-agency-ea2025-creating-a-better-place/environment-agency-ea2025-creating-a-better-place#healthy-air-land-and-water>

⁸ <https://committees.parliament.uk/writtenevidence/22353/pdf/>

“32. Water companies are investigating micro-plastics in waste water and sewage sludge, new treatment options and reviewing trade effluent agreements to reduce plastics and chemicals, taking preventative action where possible. For example, water companies have prevented the environmental release of plastic bio-beads used in waste water treatment.”

The use of bio-beads is a relatively new area for the environmental regulator traditionally focused on monitoring chemical composition of discharges from water treatment works. A potential lack of clarity on who is responsible for regulating use of this material is illustrated by the recent Environmental Information Regulations (EIR) request submitted to OFWAT that requested data about “the release into the environment by water and/or sewage companies of so called “bio beads, micro and nanoplastics, including via uncontrolled pollution events over the last three years.” [15] OFWAT, the economic regulator of the water sector, replied that the EA had responsibility for monitoring water quality in the environment, not them. Ofwat instead sets and monitors companies against outcome performance commitments such as compliance with environmental permit conditions set out by the EA or the numbers of pollution incidents.

The UK Government published a strategy to reduce litter in England called the Litter Strategy for England [17]. Although the government is acting in reducing the microplastic content in the marine environment, bio-beads are not specified in the report. However, the Department for Environment, Food and Rural Affairs (DEFRA) plays an active role in advising and influencing marine litter and microplastics research. As a member of the Marine Litter Action Network, DEFRA should be aware of bio-bead presence in the marine environment and take legal action against them.

The government also collaborates with Oil Spill Prevention, Administration and Response (OSPAR) to evaluate all products and processes that include primary microplastics, specially the use of microbeads in the cosmetic industry, and act, if appropriate, to reduce their impact on the marine environment.

The Government’s 25 Year Environment Plan will aim to prioritise the reduction of pollution of microplastics by implementing a strategy with a framework [18].

It appears that the use of existing legislation to manage biobead pollution is inadequate due partly to lack of expertise and resources and to poor communication between the different government bodies involved.

The next sections of the report outline information about bio-beads specifically in Rother, including activities of the main water company operating within the Rother district and information about existing data collection and monitoring and past pollution incidents involving bio-beads.

Bio-beads in Rother District

Information about the presence of bio-beads in Rother district comes from multiple sources.

In Rother there are two water companies supplying water; South East Water and Southern Water, but only Southern Water is responsible for water discharges and WTW. Figure 3 shows how the boundaries of Southern Water operations extend beyond Rother and East Sussex to Kent, West Sussex, and Hampshire.

Southern Water manages five WTW using bio-beads: Eastbourne, Broomfield Bank, Beckley, Peacehaven, Sandown. In response to an EIR, the water company stated they never needed to replenish bio-beads in Beckley as they never had any losses. On the EIR response about WTW Eastbourne (Appendix 5), the incidents they acknowledged to the CPPC (specified on section 5) are not mentioned. After a short visit to Eastbourne WTW, bio-beads were found at the entrance gate too.

Southern Water published their environmental policy in 2019 stating “we will prevent pollution, eliminate serious pollution incidents and contain the environmental impact of our activities” [19]. All the failed attempts to remove bio-beads suggest that this is not achievable because bio-beads cannot be removed from the environment. They also state “we will learn from our successes and from incidents, sharing best practice” [19]. While so many incidents have taken place in their BAFF WTW plants, no alternatives have been implemented. Southern Water also published a policy on plastics where they state that they will “Maintain housekeeping standards at our sites to prevent the escape of plastic litter” and “Fund research and pilot projects for

removing plastic waste, including plastic microfibres, from the water we abstract from the environment, from the treated wastewater we return to the environment and from the bioresources that we recycle to agricultural land” [20].



Figure 3 Southern Water operational boundaries.

Source: <https://www.southernwater.co.uk/our-story/area-of-operation>

Bio-beads presence and monitoring

Bio-beads can be seen in substantial amounts at Camber Sands by anyone who visits the site. Unfortunately, quantifying them is not possible as part of them are buried in the sand, part of them are washed into the sea and some are blown by the wind. Bio-beads are not only found in the strandline but also in sand dunes 3 metres above ground level and behind structures that block the wind. Their distribution along the beach is irregular and they also travel up the River Rother. Weather conditions also affect the presence of bio-beads.

In spite of the difficulties of quantifying the amount of bio-beads found polluting natural environment, there have been efforts to obtain data about this pollutant.

Andy Dinsdale, Director and Founder of Strandliners, conducts a monthly survey at Camber Sands to obtain a snapshot of amount differences between bio-beads and nurdles after a high tide. He gathers local volunteers at the same location, marked by a big sign with the letter F. They take the sign as a reference point and walk to the strandline, where most bio-beads are found among the seaweed, driftwood, shells and

other debris. In a range of 20 metres, three random points are chosen, an area of a square metre is marked and the sand surface is surveyed. As shown in Figure 3, based on the data collected by Strandliners, there has been a significant amount of bio-beads recorded in year 2018 and again a large amount recorded in year 2020.

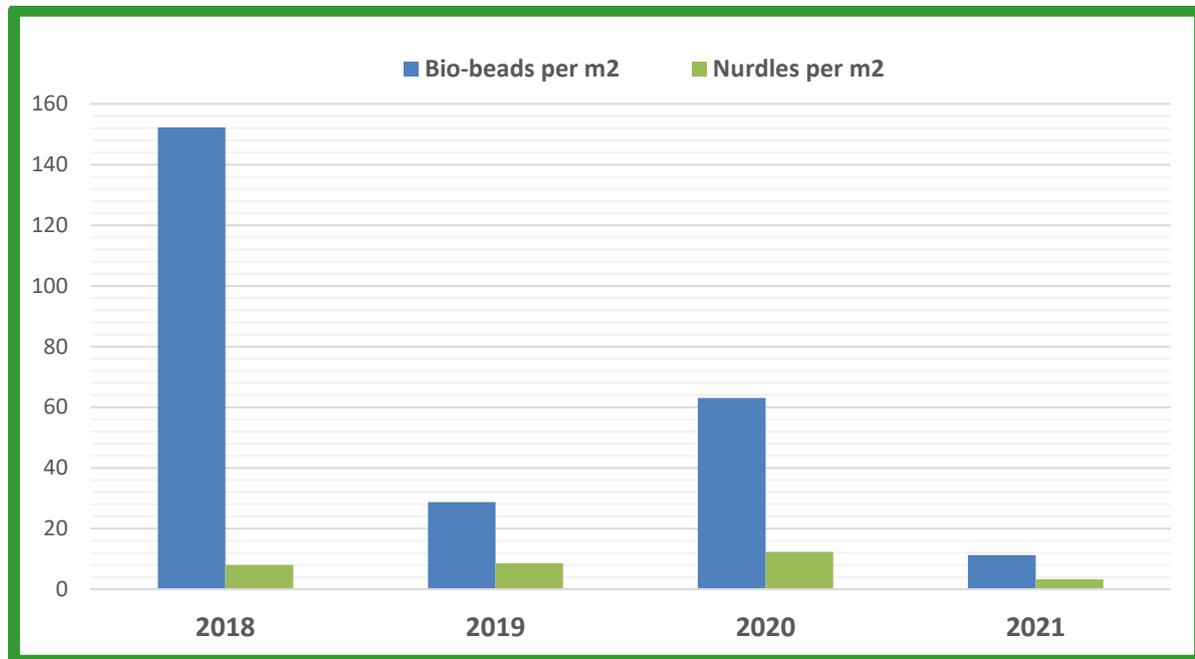


Figure 4 Bio-beads vs Nurdles per m2 found at Camber Sands, Rother District. Source: Strandliners.

Bio-beads pollution incidents

Rother District Council's Coastal Officers reported two pollution incidents to the EA relating to bio-beads; one in 2010 and another in year 2017. Location of both pollution incidents was in Camber Sands, the far eastern part of the district.

Information about the 2010 incident could not be located for the purpose of this study as it pre-dates most of the Coastal Officers time with the local authority.

The 2017 pollution incident information was available, with emails provided by the local authority's Coastal Officers. The information was used as a basis of several information requests forwarded both to the water company and to the environmental regulator, to corroborate information available about the 2017 incident. environmental information requests (EIR) were lodged with the water company under the Environmental Information Regulations 2004. A Freedom of Information (FOI) request was sent to the environmental regulator, the EA, who provided information under the

Freedom of Information Act 2000 and Environmental Information Regulations 2004. The water company, Southern Water, was very prompt in responding to the EIR requests whilst the EA responded only on 30th April, after a supervisor followed up with other EA staff to a request lodged on 11th February – that is outside of the standard 20 working days a response should have been obtained (e.g. as per information on the UK Parliament's website <https://www.parliament.uk/site-information/foi/foi-and-eir/>). These FOI and EIRs are included in the Appendices.

The FOI request confirmed the incident was reported to the EA at 12:13hrs 06/11/2017 and the decision was taken to close the investigating at 15:43hrs 09/11/2017, mere three days later. The cause of the pollution was not further investigated, source was unknown. The EA questioned the water company and was satisfied with the answer it received. The agency did not recognize the plastic pellets as bio-beads. No clean-up operation was attempted.

In an EIR request (Annex 2), Southern Water said that they never had any incidents and they never needed to replenish their bio-beads as none of them have been lost.

Photos in Figure 4 clearly show presence of bio-beads on Camber beach over the years. As part of this MSc student project, Camber Sands were visited on 5th February and 15th March 2021 and bio-beads were found to be present on the beach in Camber during both visits. Although it is not possible to scientifically determine the origin of the bio-beads found in March 2021 in Camber – from the experience of the Coastal Officers and Strandliners these bio-beads are remnants of those past pollution incidents because of the difficulties of any clean up operations that will mean it is almost impossible to remove bio-beads once spilled into the natural environment, partly due to their small size.



Figure 5 Bio-beads at Camber Sands on 15th March 2021 (Left), November 2012 (Centre), August 2014 (Right). Pictures taken by Strandliners volunteers.

The local authority's Coastal Officers now have a Shoreline Pollution Policy that they developed to deal with oil spills, which they also adapted recently for bio-bead spills (Annex 1). These are operational guidelines for dealing with incidents - these are currently not articulated in any strategic document produced by the local authority

Another incident took place in Sussex, in the Eastbourne water treatment works (WTW) which is 50 km to the west of Camber. The mentioned WTW experienced a failure of the retaining mesh. The first incident at Eastbourne was in February 2015 and they believe they captured all the pellets in the catchers before any were spilled to the environment. The second incident in March 2016 was due to a split mesh and they also believe that nothing was released into the environment. They said they added extra support to the mesh after this second incident. However, their average annual expected loss of pellets is 0.3%.

Beckley WTW

Information in this section of the report comes from a guided tour of the WTW plant that the water company offered to the MSc student on 11th March; and visits with the project supervisors on 5th February; 20th April and 27th April 2021.

The only WTW plant within the Rother district boundaries using bio-beads is located in Beckley parish, in the eastern part of the Rother district. This plant, located outside of the Beckley village, discharges to the Knelle Petty sewer, a stream connected to the River Rother (Figure 4).

Beckley WTW has had three bio-beads-filled reactors in use since 2005 with a volume of aerated media of 45.2 m³ per unit (135.6 m³ total) which equals to 1.2 billion bio-beads (3.6 billion in total). The BAFF tank contention method is the use of a single mesh to stop the bio-beads from escaping although there have been several reported incidents in other plants due to a split of the single mesh.

On site, the process-scientist explained that some bio-beads do escape during the backwash process, returning to the primary sludge processing tank. This sludge is then used in agriculture. The water company's operative also explained that any bio-beads found on the ground within the WTW plant dropped during the refurbishing process. Beckley WTW is however refurbishing their bio-beads this year, by removing all the beads into skips and reusing them. This process takes a year. Surprisingly, bio-beads were found at the entrance gate and the surroundings outside of the Beckley WTW perimeter during site visits conducted as part of the MSc project in February, March and April.



Figure 6 Map of Rother District showing the location of Beckley Water Treatment works which currently uses bio-beads (as of May 2021).

The watercourse that the Beckley plant outflows into was surveyed on two days in two consecutive weeks (On the 20th and 27th April 2021) by the MSc student and her supervisors. The sediment accumulated in surface blockages was examined downstream and upstream of the outflow. Around 100 individual beads were found on both occasions in the same blockages (made from debris, tree branches and fallen leaves) floating in the water.



Figure 7 Beckley WTW, April 2021/ Photos: a) Bio-beads found next to the tanks; b) entrance to the Beckley WTW in front of which bio-beads were also found; c) 3 BAFF tanks; d) empty bags with bio-beads still inside them, exposed to elements; e) over 1000 bio-beads found outside the perimeter of the works.



Figure 8 Bio-beads found outside of the entrance to Beckley WTW, April 2021.

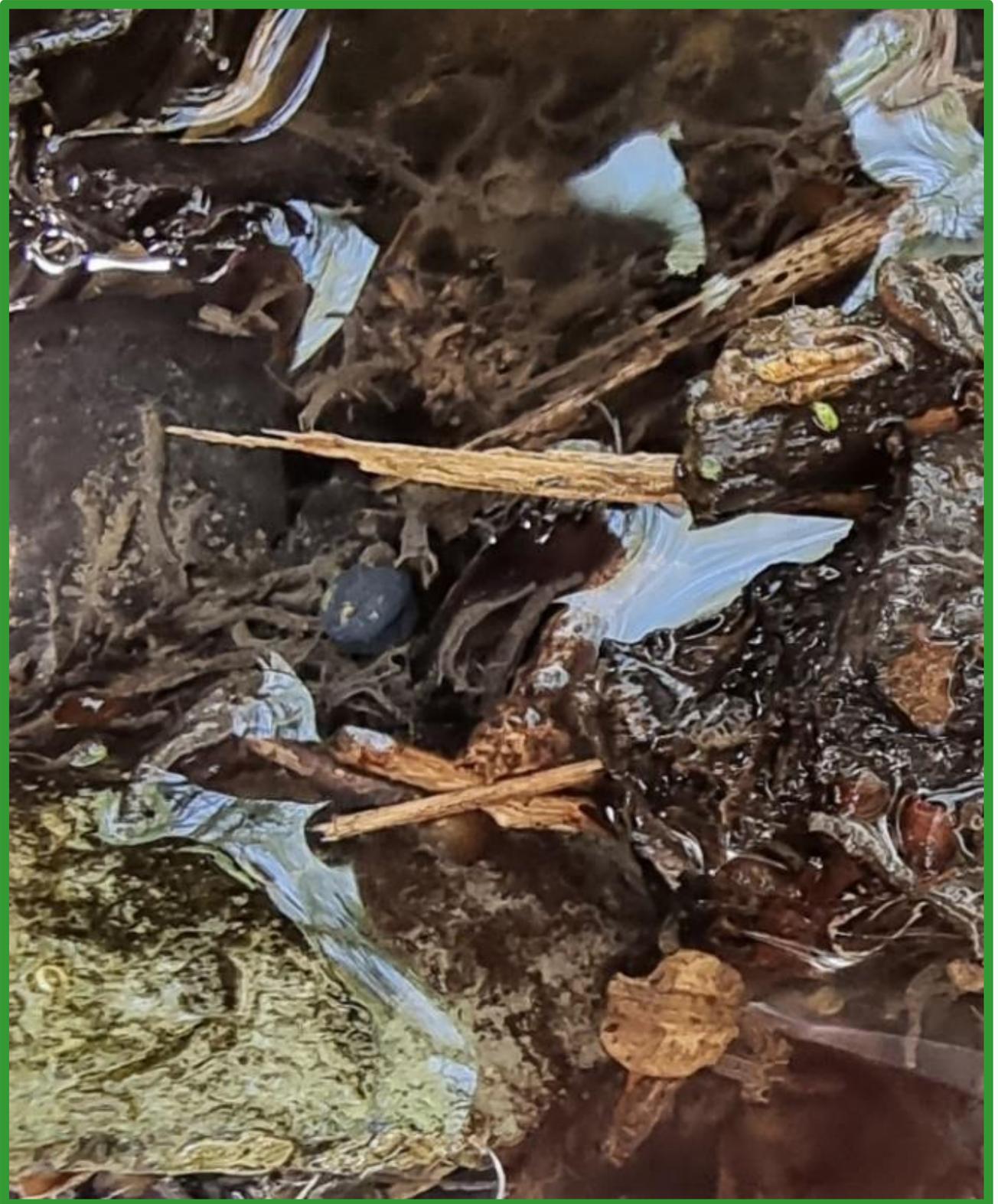


Figure 9 Bio-beads at Knelle Petty Stream, Beckley, April 2021, a close up.



Figure 10 Knelle Petty Stream bio-beads surveying, April 2021.

Conclusions and recommendations

According to its website, the Cornish Plastic Pollution Coalition is made up of 61 mainly not-for profit partners including the National Trust in Cornwall and Surfers Against Sewage. None of the partners are local authorities. The coalition's (2018, 2nd edition) report, titled *Bio-Bead pollution on our beaches*, is considered a key UK reference on the bio-beads problematic: it provides a detailed analysis of all possible sources of bio-beads loss as a comprehensive list of measures for water companies to implement.

This report is modest in its size and content in comparison to the (2018) above-mentioned report: its contribution is primarily about gathering evidence about localised bio-beads issues in one district in East Sussex. Nevertheless, this report aims to corroborate and build on the earlier (2018) report by colleagues in South West whilst also being unique. To the authors' knowledge, this is the first report on the bio-beads problematic that was commissioned by a local authority as part of its climate emergency and wider environmental agenda.

The (2018) Cornish report suggested that Cornwall and the English Channel coast are major hotspots for bio-bead pollution within the UK. This Rother District report confirms that a key coastal area around Camber Sands in eastern part of the district is indeed a bio-beads hotspot, with two major bio-beads pollution incidents reported to the environmental regulator, the EA, (in years 2010 and 2017). Camber Sands, as the name suggests, is sandy and bio-beads are visibly present there. In contrast, western beaches of the Rother District and Rye Harbour to Pett Level are shingle beaches where bio-beads are not visibly present or may have fallen through the cracks. It is unknown if bio-beads would be found there. Further research is needed on shingle coastline to determine the presence or absence of bio-beads. Because bio-beads have been found at Cuckmere Heaven and Camber Sands, it may be inferred that bio-beads are present on the shingle coastline between these two locations, but only further investigations could confirm this is the case.

The (2018) Cornish report found the local water company, South West Water, was guilty of losing bio-beads repeatedly through major spillage incidents as well as "lower level leaks"; whilst poor handling, storage, and loss during transport could be also contributors. Similarly, this Rother report has found that the local water company in

the Rother District, Southern Water, was allowing “lower level leaks” at its Beckley WTW plant through poor housekeeping and poor handling and possibly during transport. Presence of bio-beads outside of a WTW perimeter, in much smaller quantities, was also found at Eastbourne WTW – which is outside of Rother District – and this site warrants further investigation as it was not explored in detail as part of this study.

Whilst the loss of bio-beads at the Beckley may appear negligible, it must be remembered that if a failure in the containment system was to happen at this plant, up to 3.6 billion bio-beads could escape into Rother river – causing yet another major pollution incident in the Rother District.

Although the Beckley WTW was shown to experience slight bio-bead loss, the large amounts found at Camber Sands and the River Rother correspond to the origin from a different location. The large number of bio-beads found at the beach relate to big incidents that happen occasionally but due to the impossibility to clean the sea, bio-beads remain at Camber Sands. As the (2018, p.6) Cornish report, aptly puts it: “The marine plastic problem is notoriously hard to tackle given its varied sources and entry points.”

As well as improved monitoring efforts, further research is needed to study the effect of bio-beads presence on human health. Little is known about the impact of these toxic microplastics that have become an international environmental issue.

Overall, the following recommendations can be offered.

Advice to the water companies

The following advice is offered to the local water company in the Rother District, Southern Water, but is applicable to other water companies.

A key recommendation is to phase out the use of bio-beads ASAP and introduce instead much less polluting systems that do not threaten the natural environment in a way that bio-beads do. Engineering companies have developed several alternatives to BAFF media and our only hope is that the water companies invest money in

switching their treatment works into a less polluting system. Examples of alternatives were identified through a desktop research and include a use of a bio-block or electrocoagulation – these are included in Appendix.

Where water companies do use bio-beads in WTW plants and phasing out of the bio-beads technology is unlikely to occur in near future, water companies are urged to review their housekeeping and bio-beads handling guidance and training of its staff. Secondary containment systems should be introduced ASAP to the existing single steel mesh – as is the case in the Beckley WTW where an extra bio-bead trap should be placed at the sewer before releasing the water into the stream. A clean-up of bio-beads spillage is nearly impossible as demonstrated during past incidents and hence prevention of future incident is critical.

Southern Water currently chairs the Sussex Local Nature Partnership i ([website http://sussexlnp.org.uk/](http://sussexlnp.org.uk/)). Any chair of such a partnership, that aims to “secure the healthiest ecological system possible thereby protecting and enhancing the natural environment and all that it gives us”, is expected to be an exemplar environmental leader when it comes to its principles and practices. Similarly, Southern Water sits on the East Sussex Environment Board that produced the East Sussex Environment Strategy available on the council’s website:

<https://www.eastsussex.gov.uk/environment/priorities/environmentstrategy/>

Although this strategy has ‘water; as one of its priorities, the focus is solely on water quantity. One of the supervisors has a physical copy from 2019 of the draft strategy that also included water quality aspect – “all water bodies to meet the quality objective of the Water Framework Directive” – which has been removed from the latest version. In light of the findings in this report, water quality should be a key priority for the East Sussex Environment Strategy and its delivery.

Advice for the regulators

The regulators must hold water companies accountable for any environmental pollution caused by bio-beads escaping from its plants.

The environmental regulator is the EA which sets out requirements for water and sewerage companies to report on water quality, including discharges from sewage

treatment works. The recommendation here is for the EA to ensure that future discharge permits for WTW include information about bio-beads – something that the current discharge permits, its copies obtained for Beckley, Eastbourne, and Peacehaven WTW do not.

The EA is also a Category 1 Responder under the Civil Contingencies Act 2004 who categorises and reports on pollution incidents. The information relating to the year 2017 incidents suggests that the EA did not hold own independent information about the usage of bio-beads by water companies and instead relied on water companies to supply critical information relating to incident. It had not means and expertise around the clean-up operation. It held nobody accountable for the incident. There was public-wide communication about the incident, e.g. warning members of public to be vigilant and ensure that children do not accidentally swallow bio-beads whilst playing at Camber Sands on the beach. No online newspaper articles relating to these two major incidents were found using an online search.

Specialised training to the EA staff could be provided by experts like Strandliners who were an instrumental partner in this project.

As part of writing this report, the supervisors approached various EA contacts offering to share the report's findings. The EA's Technical Lead Water Quality Instrumentation responded, suggesting they were unfamiliar with bio-beads. The EA STEM Engagement Officer- Preventing Plastic Pollution Project and the EA Preventing Plastic Pollution Programme Manager responded only initially but did not respond to repeated offers to share the project's findings.

The EA report *2021 River Basin Management Plan* [16] was published in October 2019 – if since then no progress was made on the “industry initiatives” in “developing and implementing best practice initiatives to reduce accidental release of small plastic beads used in treatment and cooling water processes” and “collaborative working with water companies to prevent the loss of plastic media from their treatment processes into the environment” that is of serious concern. The EA as an organisation has again proved to be too slow in reacting and adapting to major environmental threats to the natural environment.

OFWAT is the economic regulator of the water sector and its role in relation to bio-beads regulation are explained, e.g. in the 2018 EIR [15]. Based on the findings of this study, it is suggested for OFWAT to review the measures against which it monitors water companies' compliance and performance, as a mechanism of preventing future bio-beads spills and incidents. This should be included as part of 'The voice of water consumers' reporting [26].

Advice to the public

The public should be aware of the presence and dangers of bio-beads. Such awareness may avoid children and pets ingesting bio-beads, thus minimising any adverse health impacts this could cause.

The public are an important voice in propelling change, especially where regulators may lag in action. For example, the Southwest WTW plant at Gorran Haven in Cornwall switched from a bio-bead treatment plant to an Activated Sludge Plant after a sustained campaign and pressure by environmentalists lasting two years! [22].

The public could seek changes to water companies practices and use of bio-beads in their WTW plants through raising the issue with local Councilors and MPs. Similarly, seeking swift action by regulators and by questioning the water companies' prominent roles in bodies as the local nature partnerships.

Advice for the local authority

A local authority such as the Rother District Council does not have regulatory responsibility for the use of bio-beads or their subsequent release into the environment.

Yet the local authority is urged to engage with the environmental regulator and with the water company in reviewing jointly their incident management procedures and stating an incident management exercise on the topic of bio-beads.

Whilst the council's coastal officers developed a flow chart for dealing with bio-beads incidents, the Environmental Health Officers, as admitted by the one participating in

the project, are unaware. There needs to be awareness raised across the organisation about the problematic of bio-beads. Specialised training to staff could be provided by experts like Strandliners who were an instrumental partner in this project.

Any operational instructions for dealing with bio-bead incidents need to be translated into policies and statements within strategic documents, e.g. the Local Plan that is being reviewed.

As part of raising awareness with the public, the local authority could invite the art sector to help come up with engaging ways e.g. with schools and other audiences. The public could be invited to collect bio-beads during their stay at Camber beach and to drop them at a collection bin at the entry point

Glossary

	Biological Aerated Flooded Filter
BAFF	The Biological Aerated Flooded Filter system works as a filter for solids and as a support for treatment bacteria. It is a system that allows to retain high concentrations of microorganisms, achieving excellent final effluent standards.
Bio-bead	Microplastics used as BAFF media in wastewater treatment plants.
CPPC	Cornish Plastic Pollution Coalition https://cppccornwall.org.uk/
DEFRA	Department for Environment, Food and Rural Affairs.
EA	Environment Agency
EIR	A request to provide public access to environmental information held by public authorities. Under the Environmental Information Regulations 2004
Fidra	Fidra is an environmental charity working to reduce plastic waste and chemical pollution in the marine environment https://www.fidra.org.uk/about-us/
FOI	Freedom of Information request provided under the Freedom of Information Act 2000
Nurdle	A very small pellet of plastic which serves as raw material in the manufacture of plastic products
OSPAR	The mechanism by which 15 Governments and the EU cooperate to protect the marine environment of the North-East Atlantic
Oftwat	The economic regulator of the water sector in England and Wales
PAH	polycyclic aromatic hydrocarbons
WTW	Water treatment works or; sewage treatment works

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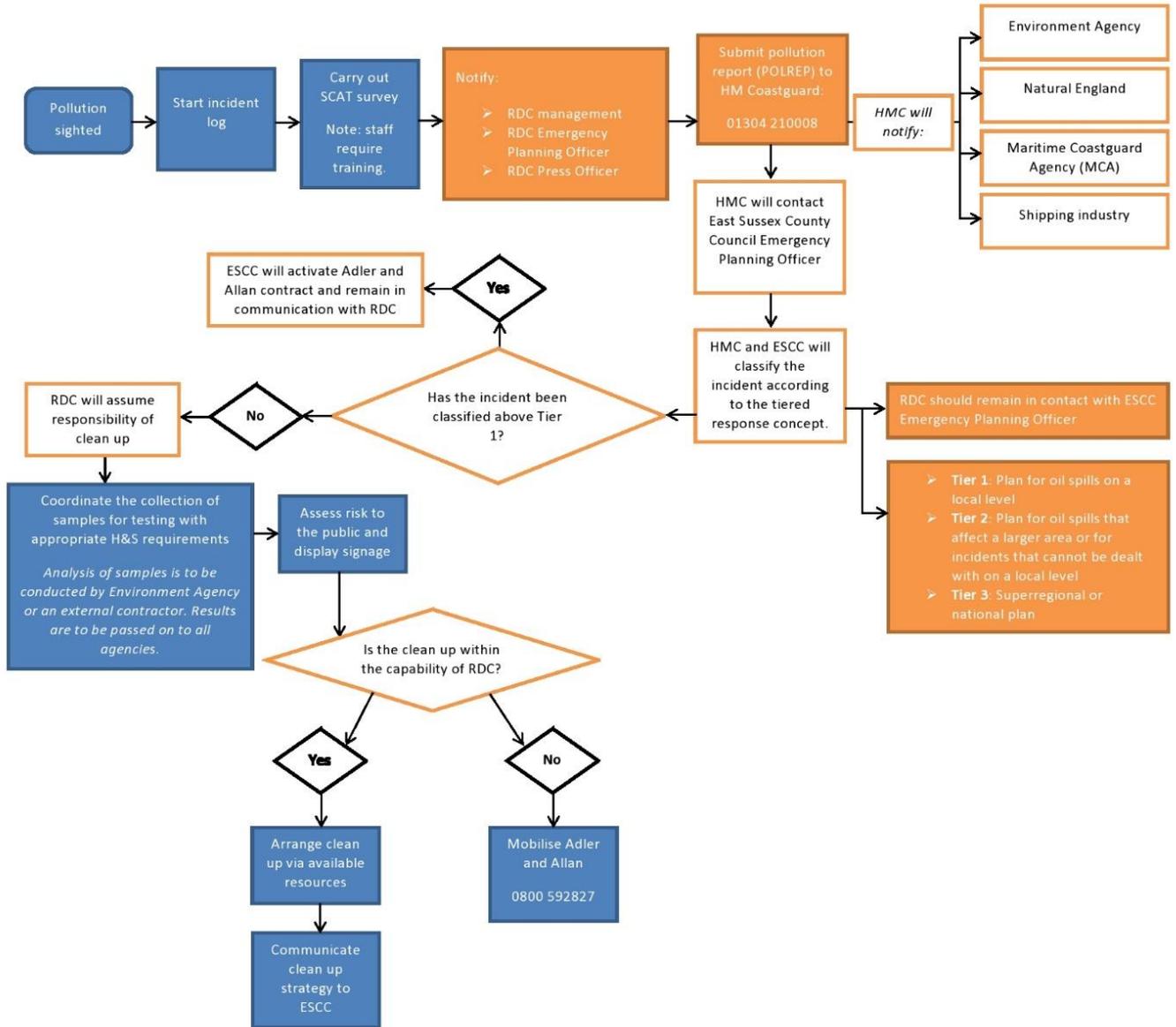
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Appendix I - RDC operational instructions on bio-beads

Overview of Coastal Officer's spill management Standard Operating Procedure (SOP).



Appendix 2 - Bio-beads alternatives

Mesh reinforcement

The WTW plants that had incidents previously have installed an extra mesh on their BAFF tanks. As mesh splits appear to be the main problem, mesh reinforcement should be implemented in every BAFF tank.

Alternative BAFF media

There are different types of media available for the BAFF systems (Table 1), including plastic free media i.e. sand and pumice, a type of volcanic rock.

Table 1 Commercially available BAFF media. Source [23]

Process	Supplier	Flow regime	Media	Specific gravity	Size (mm)	Specific surface area (m ² /m ³)
Astrasand®	Paques /Siemens	upflow, moving bed	Sand	>2.5	1 – 1.6	
Biobead®	Brightwater F.L.I.	Upflow	Polyethylene	0.95		
Biocarbone®	OTV/Veolia	downflow	expanded shale	1.6	2 – 6	
Biofor®	Degremont	Upflow	expanded clay	1.5 – 1.6	2.7, 3.5 and 4.5	1400 – 1600
Biolest	Stereau	Upflow	Pumice/pouzzolane	1.2		
Biopur	Sulzer/Aker Kvaerner	downflow	Polyethylene		Structured	
Biostyr®	Kruger/Veolia	Upflow	Polystyrene	0.04 – 0.05	2 to 6	1000 to 1400
Colox™	Severn Trent	Upflow	Sand	2.6	2 – 3	656
Denite®	Severn Trent	downflow	Sand	2.6	2 – 3	656
Dynasand®	Parkson	upflow, moving bed	Sand	2.6	1 – 1.6	
Eliminite®	FB Leopold	downflow	Sand	2.6	2	
submerged aerated filter	Severn Trent	up/down	slag washed gravel	2 – 2.5 2.6	28 – 40 19 – 38	240

Other alternatives to BAFF media include:

Bio-blok

A network of tubes made of polyethylene welded together would be the ideal substitute to bio-beads. It serves the same purpose, as the bio-blok also has a large surface area which will allow bacteria to attach [24].



Figure 11 Bio-blok, an alternative to bio-beads [24].

Electrocoagulation

Electrocoagulation presents a great alternative to the use of bio-beads. It uses technologies like reverse osmosis, ultrafiltration, nanofiltration and photocatalytic to treat and purify wastewater [25].

Appendix 3 – EIRs to Southern Water.



G.Monzo-Contreras1@uni.brighton.ac.uk

Date

16th February 2021

Contact

Tel 0330 303 0368

Dear Garazi Monzo-Contreras

The Environmental Information Regulations 2004 Request for Information

Thank you for your request for information which we received on 11th February 2021. We have dealt with your request under the Environmental Information Regulations 2004. This letter provides the response to your request, as follows:

"I am writing to make an open government request for all the information to which I am entitled under the Environmental Information Regulations. In order to assist you with this request, I am outlining my query as specifically as possible. As you will understand, this may not be a definitive list of relevant information.

According to 2018 report produced by the Cornish Plastic Pollution Coalition, there is only one STW in Rother district administrative boundary that uses bio-beads/ BAFFs: Beckley STW.

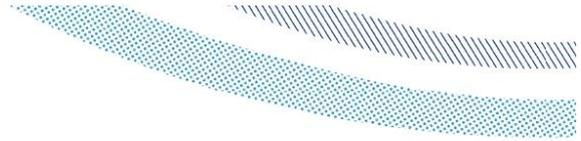
- 1) *Can you please confirm, as of Feb 2021, if Beckley STW still uses bio-beads?
Yes / No*
- 2) *If not, when did Beckley STW stopped using bio-beads? Please give month/ year.*
- 3) *Are there any other STWs in Rother that use bio-beads?
Yes – No*
- 4) *If yes – please give name(s) of STWs in Rother using bio-beads.*

I would be grateful if you could confirm in writing that you have received this request. I look forward to hearing from you in the near future."

We can confirm that Southern Water does hold information of the type you have requested as follows:

Southern Water, Southern House, Yeoman Road, Worthing BN13 3NX
southernwater.co.uk

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We believe you are referring to BAFF's (Biological Aerated Flooded Filter) as a treatment process. We can confirm that Beckley WTW does still use this process, and is the only WTW that uses this process in the Rother area.

We are entitled to make a reasonable charge for information provided under the Regulations. Details of our charging scheme can be found on our website: <https://www.southernwater.co.uk/water-for-life/protecting-the-environment/environmental-information>. In this case we have decided to waive our charge.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within forty working days of the date of receipt of this response and should be addressed to Head of Legal, Southern Water Services Ltd, Southern House, Yeoman Road, Worthing, West Sussex BN13 3NX or you can email EIR.Internal.Review@southernwater.co.uk.

If you are dissatisfied with the outcome of the internal review, you can apply, without charge, to the Information Commissioner, who will consider whether Southern Water has complied with its obligations under the Regulations, and can require Southern Water to remedy any problems. You can find out more about how to do this, and about the Regulations in general, on the Information Commissioner's website at: www.ico.org.uk. Complaints to the Information Commissioner can be made via the "report a concern" section of the Information Commissioner's website.

Please do not hesitate to contact us if you have any queries.

Yours sincerely

EIR Officer

Southern Water, Southern House, Yeoman Road, Worthing BN13 3NX
southernwater.co.uk

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing BN13 3NX Registered in England No. 2366670



G.Monzo-Contreras1@uni.brighton.ac.uk

Date

19th February 2021

Contact

Tel 0330 303 0368

Dear Garazi Monzo-Contreras

**The Environmental Information Regulations 2004
Request for Information**

Thank you for your request for information which we received on 17th February 2021. We have dealt with your request under the Environmental Information Regulations 2004. This letter provides the response to your request, as follows:

"Thank you for the quick response on my request. I would like to submit a second request relating to the use of BAFFs at Beckley WTW."

Bio-Beads/ BAFFs management

- 1) *When Beckley WTW started to use bio-beads? (month/ year)*
- 2) *Quantity of Bio-Beads/ BAFFs used at Beckle WTW in kg*
- 3) *Bio-Beads/ BAFFs replenishment/ top-up*
- a. *Frequency of replenishment. E.g. yearly/ 6 monthly*
- b. *Amount per each replenishment in kg*
- c. *Origin of replenished Bio-Beads/ BAFFs (country/ name of manufacturer)*
 - 4) *Mesh used to prevent Bio-Beads/ BAFFs escaping. Please give a description including whether single or double*
 - 5) *What secondary containment mechanisms do you have in place to prevent any losses of bio-beads? Please give a description.*

WTWS discharge into watercourses

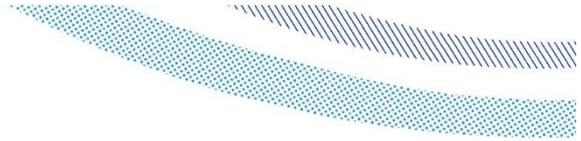
- 6) *Beckley WTW: Where do the outflows drain? Please give the name of the watercourse.*

Incidental releases of BAFFs/ bio-beads

- 7) *Please provide information on any recorded spillage/ incidental releases:*

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southernwater.co.uk

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- a. Date: day/ month/ year/ time of the day – hour
- b. Volume of Bio-Beads/ BAFFs incidentally released
- c. Duration of the Bio-Beads/ BAFFs incidental release
- d. How are BAFFs transported and stored?

8) Incident management procedures: Please describe steps taken as part of a clean-up operation"

We can confirm that Southern Water does hold information of the type you have requested as follows:

Bio-Beads/ BAFFs management

- 1) When Beckley WTW started to use bio-beads? (month/ year)
BAFFS were installed in 2005.
 - 2) Quantity of Bio-Beads/ BAFFs used at Beckle WTW in kg 7
Volume of aerated media is 45.2m³ per unit (135.6m³ total).
 - 3) Bio-Beads/ BAFFs replenishment/ top-up
We have not topped up the BAFF beads. We have refurbished the BAFF's this year, but removed all the beads into skips and re used them all. No more were needed as a 'top up' because none have been lost.
- a. Frequency of replenishment. E.g. yearly/ 6 monthly N/A –
No replenishment undertaken.
- b. Amount per each replenishment in kg N/A
- c. Origin of replenished Bio-Beads/ BAFFs (country/ name of manufacturer) N/A
- 4) Mesh used to prevent Bio-Beads/ BAFFs escaping. Please give a description including whether single or double
Yes there is a mesh – This is single mesh.
 - 5) What secondary containment mechanisms do you have in place to prevent any losses of bio-beads? Please give a description.
None, mesh only.

WTWS discharge into watercourses

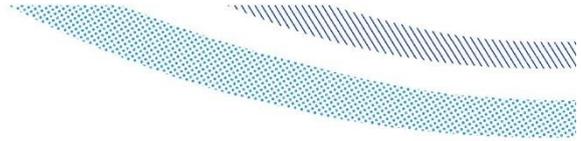
- 6) Beckley WTW: Where do the outflows drain? Please give the name of the watercourse.
The receiving watercourse is the Knelle Petty Sewer.

Incidental releases of BAFFs/ bio-beads

- 7) Please provide information on any recorded spillage/ incidental releases:
We have not had any spill of BAFF beads and no spills to final effluent.
- a. Date: day/ month/ year/ time of the day – hour N/A as above
 - b. Volume of Bio-Beads/ BAFFs incidentally released N/A as above
 - c. Duration of the Bio-Beads/ BAFFs incidental release N/A as above
 - d. How are BAFFs transported and stored? **This is a permanent part of the process. This is not temporary plant that is moved about.**

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southernwater.co.uk

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- 8) Incident management procedures: Please describe steps taken as part of a clean-up operation **N/A as above**

We are entitled to make a reasonable charge for information provided under the Regulations. Details of our charging scheme can be found on our website: <https://www.southernwater.co.uk/water-for-life/protecting-the-environment/environmental-information>. In this case we have decided to waive our charge.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within forty working days of the date of receipt of this response and should be addressed to Head of Legal, Southern Water Services Ltd, Southern House, Yeoman Road, Worthing, West Sussex BN13 3NX or you can email EIR.Internal.Review@southernwater.co.uk.

If you are dissatisfied with the outcome of the internal review, you can apply, without charge, to the Information Commissioner, who will consider whether Southern Water has complied with its obligations under the Regulations, and can require Southern Water to remedy any problems. You can find out more about how to do this, and about the Regulations in general, on the Information Commissioner's website at: www.ico.org.uk. Complaints to the Information Commissioner can be made via the "report a concern" section of the Information Commissioner's website.

Please do not hesitate to contact us if you have any queries.

Yours sincerely

EIR Officer

Southern Water, Southern House, Yeoman Road, Worthing BN13 3NX
southernwater.co.uk

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing BN13 3NX Registered in England No. 2366670



G.Monzo-Contreras1@uni.brighton.ac.uk

Date

12th April 2021

Contact

Tel 0330 303 0368

Dear Mr Monzo-Contreras

**The Environmental Information Regulations 2004
Request for Information**

Thank you for your request for information which we received on 30th March 2021. We have dealt with your request under the Environmental Information Regulations 2004. This letter provides the response to your request, as follows:

"I am writing to make an open government request for all the information to which I am entitled under the Environmental Information Regulations. In order to assist you with this request, I am outlining my query as specifically as possible. As you will understand, this may not be a definitive list of relevant information.

Bio-Beads/ BAFF media

- 1) Within the boundary of Southern water as of now, which WTW are using bio-beads/BAFF media?*
- 2) Which WTW used this technology in the past and for how long?"*

We can confirm that Southern Water does hold information of the type you have requested as follows:

Bio-Beads/ BAFF media

- 1) Within the boundary of Southern water as of now, which WTW are using bio-beads/BAFF media?*

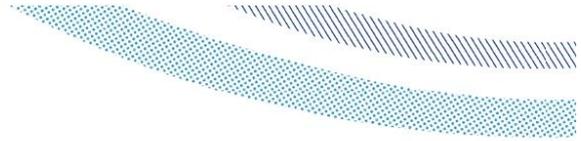
Beckley (BAFF provides additional ammonia treatment)
Eastbourne (BAFF providing secondary treatment)
Broomfield Bank (BAFF providing secondary treatment)
Peacehaven (BAFF providing secondary treatment)
Sandown (BAFF providing secondary treatment)

- 2) Which WTW used this technology in the past and for how long?*

There are no WTW sites that have used this technology in the past which are not listed above.

Southern Water, Southern House, Yeoman Road, Worthing BN13 3NX
southernwater.co.uk

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing BN13 3NX Registered in England No. 2366670



We are entitled to make a reasonable charge for information provided under the Regulations. Details of our charging scheme can be found on our website: <https://www.southernwater.co.uk/water-for-life/protecting-the-environment/environmental-information>. In this case we have decided to waive our charge.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within forty working days of the date of receipt of this response and should be addressed to Head of Legal, Southern Water Services Ltd, Southern House, Yeoman Road, Worthing, West Sussex BN13 3NX or you can email EIR.Internal.Review@southernwater.co.uk.

If you are dissatisfied with the outcome of the internal review, you can apply, without charge, to the Information Commissioner, who will consider whether Southern Water has complied with its obligations under the Regulations, and can require Southern Water to remedy any problems. You can find out more about how to do this, and about the Regulations in general, on the Information Commissioner's website at: www.ico.org.uk. Complaints to the Information Commissioner can be made via the "report a concern" section of the Information Commissioner's website.

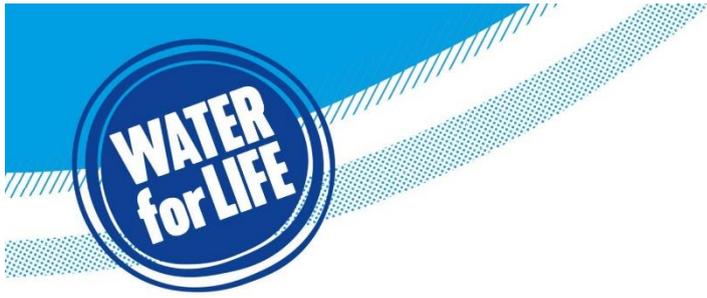
Please do not hesitate to contact us if you have any queries.

Yours sincerely

EIR Officer

Southern Water, Southern House, Yeoman Road, Worthing BN13 3NX
southernwater.co.uk

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing BN13 3NX Registered in England No. 2366670



G.Monzo-Contreras1@uni.brighton.ac.uk

Date

26th April 2021

Contact

Tel 0330 303 0368

Dear Garazi Monzo-Contreras

**The Environmental Information Regulations 2004
Request for Information**

Thank you for your request for information which we received on 14th April 2021. We have dealt with your request under the Environmental Information Regulations 2004. This letter provides the response to your request, as follows:

"I am writing to make an open government request for all the information to which I am entitled under the Environmental Information Regulations. In order to assist you with this request, I am outlining my query as specifically as possible. As you will understand, this may not be a definitive list of relevant information.

Bio-Beads management

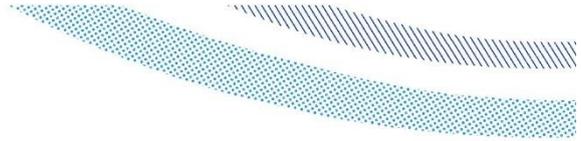
- 1) *When Eastbourne WTW started to use bio-beads? (month/ year)*
- 2) *Volume of bio-beads*
- 3) *Bio-Beads/ BAFFs replenishment/ top-up*
 - a. *Frequency of replenishment. E.g. yearly/ 6 monthly*
 - b. *Amount per each replenishment in kg*
 - c. *Origin of replenished Bio-Beads/ BAFFs (country/ name of manufacturer)*
- 4) *Mesh used to prevent Bio-Beads/ BAFFs escaping. Please give a description including whether single or double*
- 5) *What secondary containment mechanisms do you have in place to prevent any losses of bio-beads? Please give a description.*

Incidental releases of bio-beads

- 6) *Please provide information on any recorded spillage/ incidental releases:*
 1. *Date: day/ month/ year/ time of the day – hour*
 2. *Volume of Bio-Beads/ BAFFs incidentally released*

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southernwater.co.uk

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3. *Duration of the Bio-Beads/ BAFFs incidental release*
4. *How are BAFFs transported and stored?*

- 7) *Incident management procedures: Please describe steps taken as part of a clean-up operation*

I would be grateful if you could confirm in writing that you have received this request. I look forward to hearing from you in the near future."

We can confirm that Southern Water does hold information of the type you have requested as follows:

Bio-Beads management

- 1) *When Eastbourne WTW started to use bio-beads? (month/ year)*
The installation of BAFFs was in 2002.
- 2) *Volume of bio-beads*
2307.69m³ at depth of 3.7meters per cell.
- 3) *Bio-Beads/ BAFFs replenishment/ top-up*

BAFF refurbishment was completed February 2020 and levelling of beads was completed in March 2021.

- a. *Frequency of replenishment. E.g. yearly/ 6 monthly*

During the above works, the beads were pumped out from each BAFF unit and stored on site until the necessary repairs were made to the BAFF structures then pumped back in and reused.

The BAFF units at Eastbourne have not been replenished with any new beads according to our records.

- b. *Amount per each replenishment in kg*

N/A

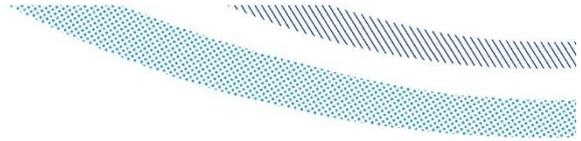
- c. *Origin of replenished Bio-Beads/ BAFFs (country/ name of manufacturer)*

Manufacturer was Brightwater, called Biobeads.

- 3) *Mesh used to prevent Bio-Beads/ BAFFs escaping. Please give a description including whether single or double*
Single stainless steel mesh.
- 4) *What secondary containment mechanisms do you have in place to prevent any losses of bio-beads? Please give a description.*
There are bead catchments on the weirs of the BAFFs wall which are mesh to allow effluent through.

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Incidental releases of bio-beads

- 5) *Please provide information on any recorded spillage/ incidental releases:*
We have no records of beads being pumped out to sea. We did have some release through the desludge valve on the BAFF in December 2020 but this was contained on site and transferred back into BAFFs over a period to March 2021.
5. *Date: day/ month/ year/ time of the day – hour* N/A
6. *Volume of Bio-Beads/ BAFFs incidentally released* N/A
7. *Duration of the Bio-Beads/ BAFFs incidental release* N/A
8. *How are BAFFs transported and stored?* N/A
- 6) *Incident management procedures: Please describe steps taken as part of a clean-up operation*
When the release occurred on site, they were tankered and pumped into the seals which had low media in them.

We are entitled to make a reasonable charge for information provided under the Regulations. Details of our charging scheme can be found on our website: <https://www.southernwater.co.uk/water-for-life/protecting-the-environment/environmental-information>. In this case we have decided to waive our charge.

If you are dissatisfied with the handling of your request, you have the right to ask for an internal review. Internal review requests should be submitted within forty working days of the date of receipt of this response and should be addressed to Head of Legal, Southern Water Services Ltd, Southern House, Yeoman Road, Worthing, West Sussex BN13 3NX or you can email EIR.Internal.Review@southernwater.co.uk.

If you are dissatisfied with the outcome of the internal review, you can apply, without charge, to the Information Commissioner, who will consider whether Southern Water has complied with its obligations under the Regulations, and can require Southern Water to remedy any problems. You can find out more about how to do this, and about the Regulations in general, on the Information Commissioner's website at: www.ico.org.uk. Complaints to the Information Commissioner can be made via the "report a concern" section of the Information Commissioner's website.

Please do not hesitate to contact us if you have any queries.

Yours sincerely

EIR Officer

Southern Water, Southern House, Yeoman Road, Worthing BN13 3NX
southernwater.co.uk

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Appendix 6 - 2017 Pollution incident bio-beads

Emails between EA and Coastal Officers.

19.5.2021

Correo: Garazi Monzo-Contreras (student) - Outlook

FW: Camber Sands beach - Black Pellets on beach

Sam Stone <Sam.Stone@rother.gov.uk>

Mié 10/03/2021 12:52

Para: Garazi Monzo-Contreras (student) <G.Monzo-Contreras1@uni.brighton.ac.uk>; strandlinerscic <strandlinerscic@gmail.com>; Kristina Sodomkova <kristina.sodomkova@rother.gov.uk>; Steve Biggs <Steve.Biggs@rother.gov.uk>

From: Sam Stone

Sent: 09 November 2017 16:40

To: Deborah Kenneally <Deborah.Kenneally@rother.gov.uk>; Lisa Hayward - Bartlett <Lisa.Hayward-Bartlett@rother.gov.uk>

Cc: Rob Cass <Rob.Cass@rother.gov.uk>

Subject: FW: Camber Sands beach - Black Pellets on beach

Hi All,

Please see update from the EA below.

Thanks,

Sam

Sam Stone
Coastal Officer
Rother District Council
T: 01424 221407
M: 07714 899 739
E: sam.stone@rother.gov.uk
W: www.rother.gov.uk

From: Hodgkins, Beverley [<mailto:beverley.hodgkins@environment-agency.gov.uk>]

Sent: 09 November 2017 16:05

To: Sam Stone

Cc: Illsley, Stephanie; Faulkner, Lindsay R

Subject: Camber Sands beach - Black Pellets on beach

Hi Sam

I have been forwarded the email below from Southern Water regarding the bio beads on Camber Sands beach for your information.

We have not as yet responded to the email as requested.

Another Colleague has confirmed that Southern Water only use bio beads at their Works in Eastbourne WWTW and Broomfield Bank WWTW, Dover. He has also confirmed that the bio beads Southern Water use are not the same as found in Camber. Southern Water bio beads are black in colour (not multi-coloured) and are uniformed in size, larger than those found.

My colleague has seen these particular bio beads before. He has suggested that they come over into England from Eastern Europe in bulk and are used in plastic manufacturing. Most likely from food packaging manufacture.

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19.5.2021

Correo: Garazi Monzo-Contreras (student) - Outlook

I will speak to my colleagues here in Canterbury and Tonbridge offices to see if we know of any Manufacturers in and around the Camber area as a start in our investigations.

Will keep you updated if and when we have any information in due course.

Bev Hodgkins
Environment Officer
Land & Water - East Kent & Stour
Kent, South London & East Sussex Area

Direct External Line: 0208 4747428
Direct Internal Line: 47428
Direct Fax: 01227 762981
Mobile: 07887 831854

From: "Child, Leslie" <Leslie.Child@southernwater.co.uk>
Date: 8 November 2017 at 17:34:02 GMT
To: "'stephanie.illsley@environment-agency.gov.uk""
Cc: Southern_Water_Pollution <pollution@southernwater.co.uk>
Subject: Camber Sands beach - Black Pellets on beach

Stephanie

We do not believe that the black pellets identified on Camber Sands beach are related to a southern Water asset.

We have visited the beach and collected some samples, they are not Bio Beads related to a sewage treatment plant.

The pellets / flakes that we collected seem to be a bit like a carbon filter media potentially something similar to Granulated Activated Carbon (GAC) but they are not the same as GAC, as the shape and size of the pellet is different to GAC that Southern Water use. Southern Water do not have any water supply works upstream on the Rother that use GAC.

As identified above we do not believe that the appearance of these black pellets is related to Southern, please can you confirm this assessment.

Regards

Les

Les Child
Pollution Manager
WWBG Technical Team
Operations



T. 01903 272234 | M. 07919
044495392
www.southernwater.co.uk

- **Report a pollution or internal flooding** - call 07557 152385 (24hr) or email pollution@southernwater.co.uk
- **Request operational below ground data** - email sm_network@southernwater.co.uk (Network Analytics)
- **For queries about intermittent discharges** - email spill.reporting@southernwater.co.uk

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Appendix 7 FOI to Environment Agency.

19.5.2021

Correo: Garazi Monzo-Contreras (student) - Outlook

RE: KSL 212122 CG - Freedom of Information request

KSL Enquiries <KSLE@environment-agency.gov.uk>

Vie 30/04/2021 19:28

Para: Garazi Monzo-Contreras (student) <G.Monzo-Contreras1@uni.brighton.ac.uk>

Dear Garazi,

Thank you for your enquiry which was received on 11 February.

I apologise for the delay in replying. This has been due to the national situation in respect of the coronavirus (COVID-19) pandemic, which is challenging for everyone at the moment.

Thank you for your patience at this time and we apologise for any inconvenience caused by the delay.

We are taking safety measures for our staff, partners and customers against the spread of coronavirus (Covid-19), in line with current government and medical advice. For the latest information from the government, please go to <https://www.gov.uk/government/topical-events/coronavirus-covid-19-uk-government-response>.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please find our answers to your questions below within your original email. Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

If you have any further queries or if you'd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months and we will happily do this for you.

Kind regards,

Charlotte Goss
Executive Correspondence and Complaints Specialist
Kent, South London & East Sussex
Environment Agency

02084 746 848 – If you are unable to reach us, please contact our National Customer Contact Centre on 03708 506 506
Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH



From: Garazi Monzo-Contreras (student) [<mailto:G.Monzo-Contreras1@uni.brighton.ac.uk>]

Sent: 11 February 2021 15:50

<https://outlook.office.com/mail/inbox/id/AAQkAGEwYTY3YTYwLWU1N2U0NDI1Ny04ODIzLWM3MjYwOTJYzExZgAQAFHpQpU6YUM2oztP16Lu...> 1/3

19.5.2021

Correo: Garazi Monzo-Contreras (student) - Outlook

To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Cc: Kristina Sodomkova <kristina.sodomkova@rother.gov.uk>
Subject: Freedom of Information request

To whomever this concerns,

I am writing to make an open government request for all the information to which I am entitled under the Freedom of Information Act. In order to assist you with this request, I am outlining my query as specifically as possible. As you will understand, this may not be a definitive list of relevant information.

Bio-Beads/ BAFs in Rother

Information about pollution incidents, Environment Agency (EA) Reference number: 3837054 / 1566446.
Reported to EA: 07/11/2017:

- 1) Please clarify if the references 3837054 / 1566446 are for the same single incident. Or are these references for two separate incidents?
3837054 is not a reference number from our NIRS system. All details relating to this incident have been taken from the notes written about NIRS 01566446.

If two separate incidents, please provide info for each as per questions 2-7 below. **This is only one incident.**
If references 3837054 / 1566446 refer to a single incident, please provide info as per these questions 2-7:

- 2) Please share the outcome of this incident investigation. **Southern Water Services confirmed that the micro plastic beads found on the beach did not originate from any of their sites. They do not have any works upstream on the Rother that use such material. It is suggested the beads are of a type imported into the UK from Eastern Europe and possibly used in the manufacture of plastic food packaging. The beads float so could either have come downstream or been washed onto the beach from off-shore.**
- 3) What source of the pollution has been identified? **The source of the plastic bead pollution was not identified.**
- 4) How much bio-beads material had been released as part of the incident? **This is not known, the material was spread along approximately 400 yards of shoreline. No clean-up operation was attempted.**
- 5) What action has the Environment Agency taken as a result of the incident investigation? **Enquiries were made in the Canterbury and Tonbridge offices as to whether anyone knew of plastic manufacturing business in the Rother area. The outcome of this is not known.**
- 6) How long had this pollution incident lasted for? Please give a number of days from it being reported, to the investigation being closed by the EA. **It was reported to us at 12:13hrs 06/11/2017 and the decision taken to close the investigation at 15:43hrs 09/11/2017.**
- 7) With whom the Environment Agency shared its investigation findings? **During the investigation the EA consulted and/or worked with Natural England, the Marine & Coastguard Agency, Rother District Council, HM Coastguard and Southern Water Services. It is not known to what extent the investigations final conclusions were shared with each organisation.**

Information about any other pollution incident involving release of bio-beads material within the Rother district administrative boundary and a radius of 30km within the last 10 years.

- 8) Please confirm the number of pollution incidents involving release of bio-beads within the Rother District boundary and a radius of 30km in the period of Jan 2010 to Jan 2021. **This is the only incident of its type thought to have occurred in the region.**

For each such incident please provide the following information: **N/A**

- 9) Date of incident: day/ month year/ time

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19.5.2021

Correo: Garazi Monzo-Contreras (student) - Outlook

- 10) How long had each pollution incident lasted for? Please give a number of days from it being reported, to the investigation being closed by the EA.
- 11) What source of the pollution was identified?
- 12) How much bio-beads material was released?
- 13) What action has the Environment Agency taken as a result of the incident investigation?
- 14) With whom the Environment Agency shared its investigation findings?

Please provide any supportive material if available. Thank you.

I would be grateful if you could confirm in writing that you have received this request. I look forward to hearing from you in the near future.

Kind regards,

Garazi Monzo-Contreras

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Bio-beads in Rother district

A report produced as part of an
MSc student placement

Authors: G. Monzo-Contreras, K.
Sodomkova, A. Dinsdale, S. Biggs

@ Rother District Council,

@ Strandliners

May 2021

