

<b>Title:</b> Implementation of the Environmental Protection (Microbeads) (England) Regulations 2017  <b>IA No:</b> Defra2083  <b>Lead department or agency:</b> Department for Environment, Food and Rural Affairs <b>Other departments or agencies:</b> N/A	<b>Impact Assessment (IA)</b>
	<b>Date:</b> 25/07/2017
	<b>Stage:</b> Final (Validation) IA
	<b>Source of intervention:</b> Domestic
	<b>Type of measure:</b> Secondary legislation
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<b>Summary: Intervention and Options</b>	<b>RPC Opinion:</b> Awaiting Scrutiny

Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANDCB in 2014 prices)	One-in, Three-Out	Business Impact Target Status
-£3.9M	-£3.9M	£0.4m	IN	Regulatory provision

**What is the problem under consideration? Why is government intervention necessary?**

Plastic microbeads in cosmetic products can pass through sewage treatment works and reach the marine environment. Once there it is impossible to recover them. They do not biodegrade, do accumulate in the marine environment and there is emerging evidence that harm may be caused by the plastics themselves or by the chemical contaminants they transport when ingested by marine animals in the marine environment. There are suitable non-plastic alternatives to microbeads in cosmetics so they are an avoidable source of pollution. Some businesses have already taken voluntary actions but others still continue to use microbeads. Therefore there is a market failure rationale for intervention based on externalities given that the environmental costs caused by microbeads to the environment are not taken fully into account by these businesses. A public consultation indicated widespread support for the approach.

**What are the policy objectives and the intended effects?**

The intervention is designed to protect the environment and food supply from further pollution, foster consumer confidence that the products they buy will not harm the environment, and support the cosmetics industry by setting a level playing field while ensuring a suitable timescale for implementation to minimise impact on the industry. It will also set an example for other countries and encourage wider adoption of legislation.

**What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base).**

**Policy option 0: Do nothing option:** Continue to support the current voluntary action from certain cosmetics manufacturers to remove microbeads from their products. Other manufacturers could still use microbeads, damaging the marine environment with unknown future food security, health, and environmental impacts. Also consumers would not have the incentive to reduce their use of cheaper cosmetics containing microbeads unless a regulatory mechanism is in place.

**Policy option 1 (current preferred option): Ban microbeads in rinse-off cosmetic and personal care products only:** This is seen as the least cost solution for industry since it would imply substitution of microbeads for benign alternatives, but only for the remaining businesses who have not already taken voluntary action. Insufficient evidence was provided during the consultation to justify extending the ban to other products. We are working with the Hazardous Substances Advisory Committee to consider the need for future action on other categories of products potentially containing microbeads. Options such as taxation or charges were excluded based on consideration of complexity, proportionality and achieving desired actions more directly.

**Will the policy be reviewed? It will be reviewed. If applicable, set review date: 01/01/2021**

Does implementation go beyond minimum EU requirements?	Yes			
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	Micro Yes	Small Yes	Medium Yes	Large Yes
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)	Traded: NA		Non-traded: NA	

***I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.***

Signed by the responsible Minister \_\_\_\_\_ Thérèse Coffey \_\_\_\_\_ Date: 27 November 2017

# Summary: Analysis & Evidence

Policy Option 1

## Description:

### FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2018	Time Period Years 10 (2018-2027)	Net Benefit (Present Value (PV)) (£m) for 10 years		
			Low: -£1.93m	High: -£10.09m	Best Estimate: -£3.90m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0	£0.23m	£1.93m
High	0.10	£1.20m	£10.09m
Best Estimate	0.04	£0.46m	£3.90m

#### Description and scale of key monetised costs by 'main affected groups'

This legislation will add additional burden only to those few companies who are still using microbeads and have not committed to discontinuing their use. The cost of a microbead ban is estimated at £0.46m per year. The cosmetics manufacturers will use a more expensive benign substitute for plastic microbeads, and a small additional one off familiarisation cost of £38,000 for the first year and annual enforcement cost on public bodies of £660 (i.e. local authorities' trading standards bodies). More details on how the costs have been estimated are found in Appendix A. Based on industry feedback, we do not expect additional costs as a result of product reformulation or relabelling, and the net impact on suppliers (importers) of microbeads in the UK is assumed to be zero. More detail on these assumptions is found in Appendix A. The Business Impact Target score is £2.0m.

#### Other key non-monetised costs by 'main affected groups'

**Alternatives to plastic microbeads** - It is likely that much of the cost for replacing plastic microbeads with benign substitutes will be passed onto consumers - This might affect the overall demand for these products but at this stage we cannot quantify the extent of the fall of this demand.

**Trade effects** - It is possible that there will be some unknown trade effects. We will test this under both the WTO and European regulations before laying the legislation in parliament.

**Capital costs** - Businesses are not expected to make any investments in new machinery in order to be able to substitute microbeads for an alternative ingredient. No costs of this kind have been included.

**Compliance** - We are developing an appeals regime but since most of the producers will be microbead free by the end of 2017 it is unlikely that these will lead to high costs. Further details can be found in Appendix A.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	N/A	N/A	N/A
High	N/A	N/A	N/A
Best Estimate	N/A	N/A	N/A

#### Description and scale of key monetised benefits by 'main affected groups'

The benefits of the ban are not quantified but are assumed to fall into two categories: benefits to businesses and environmental benefits (described below). No further substantive evidence was provided during the consultation.

#### Other key non-monetised benefits by 'main affected groups'

The microbead ban is expected to have a positive impact on the marine environment. There are other stresses experienced by marine organisms including other forms of historical pollution and ocean acidification. Adding stresses from microbeads increases the overall risk to marine ecosystems. It is not possible to monetise the benefits and no further evidence was provided during consultation but they are expected to be at least as high as the modest costs of the measure. More information can be found in Appendix A.

#### Key assumptions/sensitivities/risks

Discount rate (%)

3.5

The baseline assumes that under the voluntary approach, there would be no change in microbead use over the 10 year appraisal period. Cosmetics listed on the Beat the microbead website are a representative cross-section of the industry segments in question. A sensitivity test has been carried out around this key set of assumptions. Since silica is denser than water, there is a risk that over time there could be an increase in the build-up of silica in household drains, leading to blockages, although no such evidence was provided during the consultation. This risk has not been assessed at this stage. Cosmetics manufacturers are assumed not to invest in additional capital in order to replace microbeads. There are assumed to be no shelf life, stability of supply, or demand effects. No issues were raised during consultation towards the costs assumptions. A sensitivity test has been carried out around our best estimate of the enforcement costs involved.

### BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual 2014 prices) £m:			In scope of OITO?	Measure qualifies as
Costs: £0.4m	Benefits: £0	Net: -£0.4m	IN	Regulatory provision

# Appendix A: Evidence Base (for summary sheets)

## Introduction

The proposal is a qualifying regulatory provision which imposes restrictions on UK businesses. It bans the manufacture and sale of rinse-off cosmetics and personal care products containing plastic microbeads in order to protect the marine environment.

The approach has been developed in conjunction with a wide range of stakeholders including those from the cosmetics industry, environmental campaigners and academic researchers. A public consultation on our proposals was carried out between 20<sup>th</sup> Dec 2016 and 28<sup>th</sup> Feb 2017. It indicated widespread support for the proposals. Suggestions supplied were used to refine our definitions and to draft the legislation.

The legislation in question applies to England only. All UK Administrations are supportive of the ban but are required to bring in legislation according to their own legislative processes and timescales. We are working together to ensure this is carried out in a timely and consistent manner.

The EANDCB calculator gives an equivalent annual direct cost to (UK) business of £0.5m (2014 prices, 2015 present value) and a Business Impact Target score of 2.0.

This measure to ban microbeads from cosmetic and personal care products is in scope of One In, Two Out (OITO). It is a regulatory measure for which the monetised benefits to business are less than the monetised costs and therefore takes an IN status. We estimate that the policy generates an annual net cost to business of £0.5m.

## 1. The policy issue and rationale for Government intervention

Microbeads are small plastic particles commonly used as an exfoliating or scrubbing agent in products such as facial cleansers, shower gels and toothpastes. Up to 680 tonnes of plastic microbeads are used in cosmetic products sold in the UK every year.

They can pass through sewage treatment works, resulting in billions of tiny beads entering our seas each year. They do not biodegrade and accumulate in the marine environment. Once released in to the environment it is impossible to recover them.

Microbeads, like other microplastics, can transport chemical pollutants (already contained in the plastic, or absorbed from seawater). These small pieces of plastic can be eaten by a wide range of marine animals, including seafood. Harm may be caused by the plastics themselves and/or by the chemical contaminants they transport into the animal's digestive system. Ingestion of these microplastics can reduce digestion of food and adversely affect reproduction. Microplastics can also be passed along marine food chains.

There is little evidence of the impact to human health of microbeads, although this may be addressed by a planned review by the Department of Health. Digestive tracts, where microplastics are likely to get caught, are usually removed when preparing fish for human consumption.

In the cosmetics industry, there are suitable, economically feasible alternatives for plastic microbeads including silica, salt and ground seed kernels. Scientific evidence suggests that these alternatives do not have negative impacts to the environment<sup>1</sup>. Our public consultation requested evidence on the environmental impacts of alternatives to plastic microbeads. A variety of alternatives were suggested, as well as potential impacts that should be considered by cosmetics manufacturers during reformulation.

Microbeads in cosmetics are therefore an avoidable source of marine pollution that should be minimised in keeping with scientific advice, in particular from Defra's Chief Scientific Advisor, Ian Boyd, in April 2016.

Some businesses have already taken voluntary actions but others still continue to use microbeads (more than 72% of major cosmetics companies are expected to have ceased to sell cosmetic products containing microbeads by 2017).

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<sup>1</sup> <http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/MSFD%20Measures%20to%20Combat%20Marine%20Litter.pdf>

There exists a market failure rationale for intervention based on externalities given that the environmental costs caused by microbeads to the environment are not taken fully into account by these businesses.

A ban of this kind would help protect the marine environment from further pollution and address public concerns relating to marine environment impacts arising from such cosmetics products.

Increasing public concern relating to environmental and health issues surrounding deposit of plastic microbeads in the marine environment has led the Government to consider legislative options to address the issue. The recent report of the Environmental Audit Committee (EAC) inquiry recommended that the Government bring in legislation banning microbeads in cosmetics and personal care products. On the 3<sup>rd</sup> September 2016 Environment Secretary Andrea Leadsom announced plans to ban the sale and manufacture of plastic microbeads within cosmetics and personal care products. A public consultation on our proposals showed widespread support for the approach.

The Cosmetics Toiletry and Perfumery Association (CTPA) has already confirmed widespread voluntary replacement of plastic microbeads with more environmentally friendly alternatives. More than 72% of major cosmetics companies are expected to have ceased to sell cosmetic products containing microbeads by the end of 2017 as a result of such elective action.

## **2. Policy objectives and intended effects**

The intended effect of the regulatory proposal is to reduce the quantity of plastics entering the marine environment through personal cosmetic use. Specifically, microbead plastic introduction via 'rinse-off' cosmetics products is to be completely discontinued.

At a relatively low cost to industry, the ban is intended to:

1. Prevent further harm to marine animals and reduce growth in the overall marine litter load.
2. Protect the marine environment and reduce the risk and severity of possible irreversible effects on food security and human health.
3. Support the cosmetics industry by ensuring that the ban enables time for product adjustments which place as little additional burden on the industry as possible.
4. Continue to encourage both existing and planned voluntary industry efforts to remove microbeads.
5. Foster consumer confidence that products will not cause marine pollution.
6. Set an example for other countries and encourage wider adoption of legislation.

## **3. Policy options considered, including alternatives to regulation**

### **Policy option 0: Do nothing option**

This would continue to support the current voluntary action from certain cosmetics manufacturers in removing microbeads from their products. Choosing this option would result in some cosmetics manufacturers still using microbeads and therefore damaging the marine environment with unknown future food security, health, and environmental impacts.

Moreover, maintaining the status quo (industry-led voluntary approach to microbead removal) would not help to set an international example, and would not help to increase consumer confidence in the cosmetics industry. The ban of microbeads was therefore considered the best option since alternatives to regulation would not address these issues.

### **Policy option 1 (preferred option): Ban microbeads in rinse-off cosmetic and personal care products only.**

Our current proposals are that:

- a. We ban the manufacture and sale of cosmetics and personal care products containing microbeads in the UK.
- b. The ban would apply to solid microplastic ingredients <5mm in size in any dimension that are used as an ingredient in rinse-off cosmetics and personal care products.
- c. The ban on manufacture would apply from 1<sup>st</sup> Jan 2018 and the ban on sale from 30<sup>th</sup> June 2018.

This is considered a proportionate approach to a ban in that the option will cover solid plastic particles in products designed to go down the drain. This option is seen as the least cost solution for industry since it would imply substitution of microbeads for benign alternatives, but only for the remaining businesses who have not already taken voluntary action.

This approach also supports voluntary industry efforts to remove microbeads from cosmetic products. Given the proposed timing of the regulations enforcement, the cost to businesses of the ban arising from any changes to products is minimised.

The responses to the consultation showed broad support for the scope and timescale of the ban and therefore no further evidence on these aspects was collated.

Extension of the ban to other products beyond rinse-off requires more evidence so is not currently considered feasible. Insufficient evidence was provided during the consultation. We are working with the Hazardous Substances Advisory Committee to consider the need for future action on other categories of products potentially containing microbeads.

Options such as taxation or charges were excluded based on consideration of complexity, proportionality and achieving desired actions more directly.

#### **4. Updates from consultation**

A formal consultation on our proposals was held between 20th December 2016 and 28th February 2017. The consultation requested views on the proposed scope of the ban and how compliance should be monitored and enforced. It also sought evidence on costs to industry, particularly SMEs, as well as impacts on imports and environmental risks of alternatives to microbeads. The full list of questions related to the proposed ban on microbeads is below.

The responses confirmed that the cosmetics industry have been working to voluntarily remove microbeads from their rinse-off products and that suitable alternatives are available, although some reformulation work is still required. The responses further confirmed that work to address microbeads in leave-on cosmetics and personal care products was considerably less well advanced and would therefore take longer and have considerably higher cost to industry. Furthermore the responses confirmed doubts as to which products contained such microbeads and how they were disposed of, and raised suggestions that the potential for marine impacts from these products could be addressed by means other than a legislative ban. Therefore we have retained the scope of our proposed ban and our original assessment of costs still stands. However we have engaged with the independent Hazardous Substances Advisory Committee (HSAC) to consider the case for taking future action to address other categories of products potentially containing microbeads.

The responses suggested several potential regulators to take responsibility of enforcement of the ban, of which we have determined Trading Standards to be most suitable (more details below). We have engaged with relevant officials to confirm this and to test our cost assumptions. In light of these discussions, we can confirm that our initial pre-consultation assessment of costs of enforcement remains the same.

The responses gave details of the steps required by industry to implement the proposed ban; however they did not provide substantive evidence on costs to industry, particularly SMEs, nor on impacts on imports. Some confirmed that the phased implementation minimised cost to industry by permitting time to use up stocks. Others noted that non-plastic alternatives may be more expensive; this is covered in our analysis below.

Several respondents provided suggestions of potential alternatives to microbeads and commented on the importance of ensuring that the environmental impacts of these potential alternatives were carefully considered before being used. We agree that it is important for manufacturers to ensure that any alternatives to plastic microbeads should be sustainable and that their impact on the environment should be carefully assessed.

#### ***Consultation questions on the proposals for a ban***

*a. Are our proposals for a ban fit for purpose? If not, please explain why. What alternative wording in a ban would most effectively reduce the risk of microplastic particles from personal care and cosmetic products reaching the marine environment?*

*b. This proposed ban applies to rinse-off cosmetics and personal care products including but not limited to exfoliating scrubs, shower gels and toothpastes. Is this category appropriate? If not, what range of products should*

*the ban apply to, bearing in mind that the purpose of the ban is to protect the marine environment? Please supply evidence to support your suggestions.*

*c. Should any products be exempt from the ban? If so, please supply evidence to support your suggestions.*

*d. If products are not designed to go down the drain, but may still be disposed of in this way, what interventions or warnings are appropriate to protect the marine environment?*

*e. How should compliance with the ban be monitored?*

*f. Our proposals for enforcement are set out at point (f) on page 9. We would welcome comments on our proposed approach, suggestions for alternative approaches and views on how enforcement of the ban can most effectively and proportionately be carried out? Details of the types of civil sanctions available are set out in the Regulatory Enforcement and Sanctions Act 2008 Part 3 Civil Sanctions sections in particular sections 39, 42 and 4612.*

*g. What costs and/or constraints would industry, including in particular small and medium-sized enterprises (SMEs), incur in meeting a ban on microplastics in cosmetics and personal care products?*

*h. To what extent will imports be affected by the ban? Please supply evidence to support your suggestions.*

*i. What are the risks that alternatives to microbeads will themselves have significant environmental impacts? If so, how could these risks be avoided, minimised or mitigated? Please supply evidence to support your suggestions.*

## **5. Expected level of business impact**

There are estimated to be around 300 cosmetics manufacturers in the UK. Of these, the vast majority are small companies and are unlikely to be using plastic microbeads. The size of the UK cosmetics industry is £9.1bn in sales per year.

Of the larger companies, the majority are already acting voluntarily to discontinue microbead use (see below). More than 25 major companies have already committed to being microbead free by 2017. ProTec Ingredia, an importer of microbeads in the UK, estimate that sales of their own microbeads have fallen around 85% (35 tonnes to 5 tonnes) between 2012 and 2016, and that their partners and competitors are in a similar position.

In some cases the term “microbead” has been used by these companies to refer only to those plastic particles added for cleansing and/or exfoliating reasons. However this legislation defines microbeads as “any water-insoluble solid plastic particle of less than or equal to 5mm in any dimension”. The ban therefore extends to all microplastic particles in rinse-off personal care products, irrespective of the reasons for which they are added.

During the public consultation we asked for evidence as to the impact of the proposed ban on industry. We received evidence of the impact of banning microbeads added to rinse-off products for cleansing and exfoliating reasons, supporting our initial assessment of the economic impact of the ban. We did not receive evidence that microbeads were used for other reasons. However, we have since been alerted that microbeads may also be used for other purposes but in the absence of any further information being made available on the extent of such use or the extent to which any such products might be affected by the regulations, this Impact Assessment remains valid in terms of the evidence available.

The UK Cosmetics, Toiletry and Perfumery Association (CTPA) has estimated that the vast majority of UK cosmetics production will be microbead free by the end of 2017. CTPA and Defra elaboration of data from the “Beat the microbead” campaign website<sup>2</sup> shows 72% of all major cosmetics companies (by number of companies, not share of output) will have ceased to produce and sell cosmetic products containing microbeads by the end of 2017. Reckitt Benckiser has committed to achieving this a year later (by 2018). Avon, Steiner Leisure, Christian Dior, Elisabeth Arden and ARK Skincare lack specific commitments to microbead removal by this date and could be directly impacted by the ban. All high street retailers will have ceased to sell ‘own-brand’ cosmetic products containing microbeads by the end of 2017. Among these, 1/3rd (Boots, Wilko Ltd, Waitrose) will remove all cosmetics (including third party products) products from sale by this date.

This legislation will add additional burden only to those few companies who are still using microbeads and have not committed to discontinuing their use.

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<sup>2</sup> <https://www.beatthemicrobead.org/en/industry>. The 72% figure was obtained by contacting from the ‘ban the microbead website’, individual company statements/press releases and direct phone calls to their customer service operators.

Due to lack of other evidence and based on best available information on the product lists provided by the “Beat the microbead” campaign website<sup>3</sup>, we have estimated the proportion of products that will continue to contain microbeads in the absence of a ban. 1 Toothpaste of 117 listed (1%), and 72 of 886 face care products listed (8%) contain microbeads with no plans to phase out. The face care products listed are primarily facial scrubs.

According to the CTPA annual report<sup>4</sup>, the UK is a net importer of cosmetics products, running a trade deficit of £137m in 2015 (1.5% of industry size by sales). In 2015, imports were 36% of total industry size by sales. For the beauty products category (which includes face care) this figure is 39%.

In terms of origin, 78% of beauty product imports come from other EU countries or from North America. The US are currently introducing a microbead ban<sup>5</sup>, and certain European countries are exploring the possibility of banning microbeads. Moreover, industry statements<sup>6</sup> on phasing out microbeads generally refer to global removal. This suggests that a very small percentage of imports are likely to be affected by the ban.

Using the estimates above for the percentage of different products sold that contain microbeads, and the volume of imports in those product categories from the CTPA report, we can estimate that around £30m worth of products that contain microbeads will continue to be imported into the UK each year in the absence of a formal ban (around 1% of total cosmetics imports). This assumes that imports and domestically produced products are equally likely to contain microbeads. Since the UK is a (small) net importer of cosmetics products it seems reasonable to think that the UK is also a net importer of cosmetics products that contain microbeads, although no evidence is currently available to support this suggestion and none was provided during consultation.

No company currently manufactures plastic microbeads within the UK. Cosmetics ingredient suppliers typically supply both plastic microbeads and their substitutes. Therefore the net effect on microbead suppliers is assumed to be zero. This also assumes that suppliers’ profit margins associated with microbeads are equal for benign alternatives.

The effects of the ban will be limited to cosmetics producers.

## 6. Costs

The cost of a microbead ban is estimated at £0.5m per year. This is made up of a higher cost to UK cosmetics manufacturers of using a more expensive benign substitute for plastic microbeads used in exfoliating rinse-off products (around £0.46m per year), and a small additional annual enforcement cost on public bodies of £660 (i.e. local authorities’ trading standards bodies).

Over a 10 year appraisal period the total discounted cost of the ban is estimated at £3.9m. The calculations are provided below.

A proportion of these costs may be considered to be transitional (familiarisation) costs; the remainder are on-going (operational) costs.

Costs to businesses arising directly from the proposed regulation will not apply to those firms who already have plans to remove microbeads from their products before the introduction of the ban (the vast majority).

Only those businesses with no plans to remove microbeads will be affected.

Based on industry feedback, we do not expect additional costs as a result of product reformulation or relabelling, and the net impact on suppliers (importers) of microbeads in the UK is assumed to be zero.

Costs are categorised under the following headings: Reformulation and relabelling; Cost of substituting microbeads for a benign alternative; Capital costs; Shelf life, stability of supply, and demand effects; Enforcement costs; and Trade effects.

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<sup>3</sup> <http://beatthemicrobead.org/en/product-lists>.

<sup>4</sup> <http://www.ctpa.org.uk/annualreport/2015/files/assets/common/downloads/CTPA%20Annual%20Report%202015.pdf>

<sup>5</sup> <https://www.congress.gov/114/plaws/publ114/PLAW-114publ114.pdf>

<sup>6</sup> <https://www.beatthemicrobead.org/en/industry>

## 6.1. Reformulation and re-labelling

As the ban comes into force, affected cosmetics manufacturers will reformulate their products to remove microbeads as an ingredient. They will also have to relabel their products to take the different ingredients into account.

However, Unilever<sup>7</sup> have stated that they were able to phase out microbeads at no additional cost. This is assumed to be because reformulation and relabelling of cosmetics is a routine process that takes place periodically. The timescale of the ban will give manufacturers time to reformulate their products as normal. Small manufacturers without these processes in place are assumed to be unlikely to use microbeads as an ingredient, since these manufacturers tend to focus on boutique or artisanal products.

Consequently, reformulation and relabelling are assumed to have zero additional cost.

## 6.2. Cost of substituting microbeads for a benign alternative

In order to maintain product quality and functionality (microbeads are generally used as an abrasive) businesses are assumed to substitute microbeads for a benign alternative.

### 6.2.1. Key facts

According to ProTecIngredia, the cheapest (and most popular) substitute for plastic microbeads is silica. The base price for silica is between £7-10 per kilo (£2-5 more expensive per kilo than polyethylene microbeads, which comprise more than 90% of microbeads used in cosmetics).

According to ProTecIngredia, natural alternatives range in price up to £60 per kilo. However, high price alternatives are assumed not to be a direct substitute for microbeads. Firms that reformulate using more expensive alternatives are assumed to do so for reasons besides the microbead ban (for example, in order to have a unique selling point for the product). Therefore, only the additional cost of replacing microbeads with the next cheapest alternative (silica) has been assumed to represent the viable and sustainable option for substituting plastic microbeads. Silica is an inert, non-toxic substance naturally occurring in the earth's crust, which does not pose a risk to marine animals. From the Eunomia report<sup>8</sup>, "it will almost certainly behave in a similar way to other sand and grit particles".

Cosmetics ingredient suppliers typically supply both plastic microbeads and their substitutes. Therefore the net effect on microbead suppliers is assumed to be zero. This also assumes that suppliers' profit margins associated with microbeads are equal for benign alternatives.

### 6.2.2. Assumptions to derive costs

Weight of total products sold in each category is calculated using UK CTPA sales data for each product segment<sup>9</sup> and a typical weight and price for each product category.

Total sales are divided by a typical price and weight for each product type (£2 for 100g of toothpaste, and £4 for 150g of face scrub). These product characteristics are based on light-touch market research<sup>10</sup>, and the assumption that products containing microbeads are more likely to be aimed at the mass market, and will therefore tend to be in a lower price bracket. The suitability of the estimates will be influenced by how these assumptions relate to actual product compositions and sales. The figures are presented in Table 1 below.

**Table 1 - Cosmetics product characteristics used for microbead appraisal**

Product type	Average product price	Average weight	Industry category size (annual)	Estimated total weight of all products sold by industry category (annual)
Toothpaste	£2	100g	£461m	197 tonnes
Face scrub	£4	150g	£974m	2971 tonnes

<sup>7</sup> <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/environmental-impact-of-microplastics/oral/34702.pdf>

<sup>8</sup> <http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/MSFD%20Measures%20to%20Combat%20Marine%20Litter.pdf>

<sup>9</sup> <http://www.ctpa.org.uk/annualreport/2015/files/assets/common/downloads/CTPA%20Annual%20Report%202015.pdf>

<sup>10</sup> Using product searches on <http://www.boots.com/>

Having calculated the total weight of products sold, we can estimate the weight of microbeads that will need to be substituted for a benign alternative using scientific data on product microbead content (from the Eunomia report on microplastics prepared for the European Commission<sup>11</sup>), and the size of the cosmetics market that has no plans to phase out microbead use. We can then apply the price differential between the microbeads and microbead alternative to the weight of microbeads affected.

The Eunomia report prepared for the European Commission suggests that microbead content by weight was found to be between 2-4% for toothpaste and 0.4-10.5% for facial scrubs. For this appraisal we have used 3% for toothpaste and 5% for face care products. This information is presented in the table below.

**Table 2 - Microbead content by product type**

Product type	Product microbead content (by weight)	Share of volume of products that use microbeads with no plans to phase out (from Beat the microbead product lists)	Weight of microbeads used by product category (annual)
Toothpaste	3%	1%	6 tonnes
Face scrub <sup>12</sup>	5%	8%	149 tonnes

For this appraisal, it is assumed that all manufacturers who would use microbead ingredients in the absence of a ban will use silica at a price of £8/kilo (an additional £3 per kilo). We have assumed that large cosmetics manufacturers have significant purchasing power and are therefore considered likely to pay nearer the bottom of the silica price range than the top.

This method suggests that there are 155 tonnes of microbeads in cosmetics products that will not be phased out in the absence of a ban. If we multiply the 155 tonnes of microbeads by the additional £3 per kilo (£3000 per tonne) that it costs to replace microbeads with silica, this process results in a best estimate for the **additional cost of UK manufacturers replacing microbeads with a benign substitute of £0.46m per year.**

UK imports of cosmetics products are roughly equal to exports (trade deficit in cosmetics products of less than 2% of industry sales). We therefore assume that the cost to manufacturers who sell in the UK is equal to the cost to UK manufacturers (who would have to remove microbeads from products that are sold abroad).

The method used above assumes that the products listed by Beat the microbead<sup>13</sup> are a suitably representative snapshot of the cosmetics industry. This source is frequently updated and may therefore be thought to be a relatively accurate picture of emerging manufacturer positions on microbead phase outs.

However, there are also issues with this source. The list is unlikely to represent a complete picture of the cosmetics industry, or to list every product sold in each category. For this appraisal, the effect of motivated consumers wishing to list products that contain microbead ingredients is assumed to balance against that of manufacturers wishing to promote that their products are microbead free.

It is also assumed that products that contain microbeads sell on average as well as products that are microbead-free. In fact, consumers may wish to avoid products that contain microbeads if they consider them unethical. On the other hand, microbead products are more likely to be produced by large manufacturers and therefore be aimed at the mass market. For the purpose of this appraisal these effects are assumed to balance.

On account of the issues with this key piece of evidence, we have also conducted sensitivity tests to look at what the impact would be if our best estimate approach (above) is overly optimistic about the cost of replacing microbeads with a benign substitute, or overly pessimistic.

Our high estimate uses an extremely conservative approach to estimate the size of the microbead input to the cosmetics industry.

The 2014 ONS supply and use tables<sup>14</sup> list the input structure of each industry in terms of combined domestic and imported goods and services. Using this information we are able to estimate the input of microbeads to the UK cosmetics industry.

<sup>11</sup> <http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/MSFD%20Measures%20to%20Combat%20Marine%20Litter.pdf>

<sup>12</sup> Total size of face scrub segment calculated as the sum of “face care non-medicated” and “face care male” subsections on the CTPA annual report

<sup>13</sup> <http://beatthemicrobead.org/en/product-lists>

<sup>14</sup> <https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/inputoutputsupplyandusetables>

The intermediate input of manufacture of petrochemicals (which contains plastic microbeads<sup>16</sup>) to the “Soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations” category (which contains the cosmetics industry) is listed as £2m.

If we assume that all of this £2m is spent on microbeads then we can estimate the increase in cost of replacing this input with silica. Silica is 60% more expensive per kilo, which would lead to an additional cost to UK cosmetics manufacturers of £1.2m.

This estimate is extremely conservative. It is based on 2014 ONS data that will not take account of voluntary reductions in microbead use by the cosmetics industry. Unilever have taken a leading role in removing microbeads from products, but did not complete their global phase-out until 2015. While this estimate assumes that cosmetics manufacturers will continue to use plastic microbeads at the same rate that they did in 2014, many manufacturers have plans to phase out microbeads by the end of 2017, and so will not be affected by the ban.

There will also be other non-microbead petrochemical inputs included in the £2m figure, such as the manufacture of other organic chemicals. The proposed ban will also only apply to rinse-off products, which is likely to be only part of the total cosmetics industry.

So while the additional cost to the cosmetics industry of replacing microbeads with a benign alternative is likely to be far lower, we have used £1.2m as a high estimate as it represents a worst-case scenario for additional input costs. It is quite unlikely that such extra costs will materialise.

We have also assessed the possibility that our best estimate of the additional cost of replacing microbeads with a benign substitute is overly pessimistic. If products containing microbeads sell less well than average cosmetic products then our best estimate of the cost to manufacturers will be too high. Likewise, we will have overestimated the cost to industry if there are additional industry plans to phase out microbeads that we have not included in our baseline. For example a firm may not wish to publicise a phase out of microbeads if it is planned to take place over a relatively long time scale, as this may lead to negative publicity.

Therefore we have also included an indicative low estimate for the cost to UK manufacturers of replacing microbeads with a benign substitute. Our low estimate is half of our best estimate, at £0.23m per year. These three estimates are summarised in the table below.

**Table 3 - Sensitivity test for the cost of replacing microbeads with a benign substitute**

	<b>Low estimate</b>	<b>Best estimate</b>	<b>High estimate</b>
Cost of replacing plastic microbeads with a benign substitute (annual)	£0.23m	£0.46m	£1.2m

It is likely that much of the above cost will be passed onto consumers. This might affect the overall demand for these products but at this stage we cannot quantify the extent of the fall of this demand. No evidence was provided during the consultation. If appropriate this could be considered as part of the review in 2021.

### **6.3. Capital costs**

Businesses are not expected to make any investments in new machinery in order to be able to substitute microbeads for an alternative ingredient. No costs of this kind have been included.

### **6.4. Shelf life, stability of supply, and demand effects**

According to ProTec Ingredia, replacing microbeads with a natural alternative could reduce product shelf life (the length of time products remain fit for sale on shelves) from 10 years to between 1-2 years. However, this effect is assumed to have no additional cost since products are not expected to remain on shelves for that length of time anyway. There may also be other ingredients that could limit the shelf life of products to below 10 years.

Certain natural alternatives to microbeads (for example, beeswax) can be susceptible to unstable supply, increasing costs for businesses if there is a shortage (for example, due to a bad harvest). The increased risk of supply chain instability has not been quantified at this stage. As described above, high cost natural alternatives are not a direct substitute for microbeads and it is assumed that manufacturers will substitute microbeads for the next lowest cost alternative (silica). No further information was supplied during consultation.

<sup>15</sup> <http://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/methodologies/nationalaccounts>

<sup>16</sup> <http://siccodesupport.co.uk/sic-division.php?division=20>

Replacing microbeads with a benign substitute is assumed to have no impact on product quality, and therefore no impact on product demand. No additional cost to businesses as a result of reduced demand is included

## 6.5. Enforcement costs

Enforcement costs will not fall on businesses. Trading standards are expected to enforce the ban, since they currently enforce Regulation (EC) No 1223/2009 on cosmetic products ingredients. There are 1379 substances that are currently banned from cosmetics, and a further 296 substances that are restricted<sup>17</sup>.

Adding a ban on microbeads is estimated to have a transition cost of between 0 and £95,000.

Frequent changes to the list of banned cosmetics ingredients mean that **familiarisation** with an additional prohibited substance can be considered part of business as usual, with no specific enforcement plan required. Zero familiarisation cost for enforcement is considered the low estimate.

However, domestic implementation of the microbead ban and the relatively high public profile of microbeads may mean that explicit advice provision and/or enforcement is required. An indicative estimate of the additional **familiarisation** burden that this would place on 190 local authority trading standards bodies is 2 days of staff time at £100/day. Therefore the best estimate for familiarisation cost of enforcement is £38,000.

A high estimate for the familiarisation cost is based on 5 days of staff time at £100/day per local trading standards body, which gives a total estimate of £95,000.

In addition to the familiarisation costs, **annual enforcement** costs are expected to be between £0-6,600 per year. The lower estimate is based on enforcement of the microbead ban as part of business as usual alongside other restrictions on cosmetics products. It is assumed that trading standards would be able to test for microbead content alongside checking for other banned substances at no additional cost.

An intermediate best estimate is based on the amount that trading standards are assumed to spend on enforcing restrictions on cosmetics ingredients per banned substance (since one banned substance will be added).

Total trading standards expenditure in England in 2015/2016 was £115m<sup>18</sup>. Assuming this is equally divided between 6<sup>19</sup> activity areas (consumer safety, counterfeit goods, product labelling, weights and measures, under-age sales, and animal welfare), each activity area would have expenditure of £19m. If this product safety budget is equally divided between 20<sup>20</sup> categories (for example cosmetics, toys, and fireworks) then the budget for enforcing restrictions on cosmetics products in England is estimated at around £0.96m. If we scale this figure up using national GVA figures<sup>21</sup> we can estimate a total UK cosmetics enforcement budget of £1.1m.

There are currently 1675 restrictions on the contents of cosmetics ingredients. Dividing the total UK figure by the number of current restrictions results in an estimated additional burden of enforcing the microbead ban of £660 per year.

Due to the relatively high public profile of microbeads, trading standards may introduce some specific enforcement activity for the microbead ban, although this is considered unlikely as compliance is anticipated to be high. Specific enforcement of this kind is indicatively assumed to be 10 times more burdensome than business as usual enforcement, with a cost of £6,600 in the first three years, before falling to £660 for the rest of the appraisal period.

**Table 4 - Summary of enforcement costs**

	Low estimate	Best estimate	High estimate
Familiarisation cost (year 1) – One-off costs	£0	£38,000	£95,000
Annual cost (years 1-3)	£0	£660	£6,600
Annual cost (years 4-10)	£0	£660	£660

It is likely that an appeals' regime would be needed (e.g. compliance notice and possible impact on the tribunals system).

<sup>17</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1473246448678&uri=CELEX:02009R1223-20160812>

<sup>18</sup> <https://www.gov.uk/government/statistics/local-authority-revenue-expenditure-and-financing-england-2015-to-2016-individual-local-authority-data>

<sup>19</sup> <http://www.tradingstandards.uk/jobs/jandc-careerints.cfm>

<sup>20</sup> <https://www.businesscompanion.info/en/quick-guides/product-safety>

<sup>21</sup> <http://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2015>

An appeals regime has been developed in collaboration with Ministry of Justice and Her Majesty's Courts and Tribunals Service. The exact costs of such a regime have not been calculated, however it is estimated that there will be <10 appeals generated per year and that this will decrease in subsequent years as compliance increases because the prohibition becomes "normalised". No additional specialist expertise would be required above that already present on the tribunal panel. The most appropriate chamber for appeals is the General Regulatory Chamber of the First-tier Tribunal (this covers the environment jurisdiction). These appeals will take place in England only. As environmental subject matter is devolved, Scotland, Northern Ireland and Wales will be introducing their own secondary legislation.

## 6.6. Trade effects

Since the assumption is to ban both production of microbeads and sale of products containing them, it is possible that there will be some unknown trade effects to be tested under both the WTO and European regulations. However, the trade effects associated with this specific proposal are probably low given that certain European countries are already exploring the possibility of banning microbeads, and a US ban is currently being introduced. We are notifying the WTO and EU of our proposals to allow representations under the Technical Barriers to Trade Agreement and Technical Standards Directive respectively, prior to laying the Statutory Instrument in parliament. France has already notified the EU and WTO of their proposals for a similar ban and has not received significant objections so we do not anticipate problems. In addition, in June 2016 EU Member States called on the European Commission to develop proposals for an EU ban of microbeads as part of the 2017 Plastics Strategy. In June 2017 the OSPAR Commission called on the EU to introduce appropriate measures to achieve a 100% phasing out of microplastics in personal care and cosmetic products in line with Action 47 of the OSPAR Regional Action Plan on Marine Litter.

Moreover, since most of the UK cosmetic industry (some operating at an international scale) is already taking voluntary action, the assumption is that only a minor percentage of trade will be affected (preliminary analysis suggests around 1% of cosmetics imports – see section 5). No additional evidence was provided during the consultation. We continue to engage with European partners in regard to an EU-wide ban, particularly through OSPAR.

## 6.7. Cost summary

A summary of monetised costs for the first year of the ban is found below.

**Table 5 - Cost summary (year 1)**

Cost Type	Low estimate	Best estimate	High estimate
Substitution with a benign alternative	£0.23m	£0.46m	£1.20m
Enforcement cost	£0	£0.04m	£0.10m
Total cost (year 1)	£0.23m	£0.50m	£1.30m

The total costs over the appraisal period (2018-2027) are presented in Table 6 below.

**Table 6 – Total discounted costs (over 10 years, discount rate 3.5%)**

Cost Type	Low estimate	Best estimate	High estimate
Total discounted costs over the appraisal period (2018-2027, base year 2017)	£1.93m	£3.90m	£10.09m
Equivalent annual cost	£0.19m	£0.39m	£1.0m

## 7. Benefits

Benefits are difficult to monetise but are assumed to fall into two categories: benefits to business and environmental benefits. A review will be carried out in 2021; this may support the identification of such benefits.

### 7.1. Benefits to businesses

There has been little assessment of the potential economic consequences of increased microplastics in the ocean. However there are some benefits that can be regarded as likely.

Removing plastic microbeads may lead to increased consumer perceptions that cosmetics products will not cause damage to the marine environment. This may lead to an increase in demand for some products not containing microbeads, particularly face scrubs.

The European Chemical Agency (ECHA) has produced a socio-economic dossier on the UK proposed restrictions of certain substances (namely octamethylcyclotetrasiloxane (D4) and decamethylcyclopentasiloxane (D5)). For this purpose a stated preference study was conducted<sup>22</sup> suggesting that consumers valued a reduction in microplastic accumulation from cosmetics seven times more highly than superior personal care product quality. This implies that a ban on plastic microbeads could have a positive effect on consumer preferences and hence lead to increase profit margins to businesses when removing microbeads from their products.

Due to limited evidence available, the benefit to businesses of increased consumer confidence has not been quantified at this stage. It would have been disproportionate to analyse this matter during consultation.

However an economic analysis demonstrated that there are potential costs associated with microplastics to the aquaculture sector in the UK (*Van der Meulen, M.D., DeVriese, L., Lee, J., Maes, T., Van Dalfsen, J.A., Huvet, A., Soudant, P., Robbens, J., Vethaak, A.D. (2014). Socio-economic impact of microplastics in the 2 Seas, Channel and France Manche Region: an initial risk assessment. MICRO Interreg project Iva*). A microbead ban may reduce the level of plastic getting into the marine food chain, and lead to relatively healthier fish populations<sup>23</sup>. This could have a positive impact on businesses that rely on healthy fish stocks, for example, the fishing and fish processing industries. However, the relationship between animal ingestions of microplastics in commercially-significant species and effects to their health are unknown and the consultation provided no further substantive evidence on the economic impact of a ban on microbeads.

There may be some positive effect of setting an example for our neighbours, making it more likely that neighbouring countries will implement similar bans. Oceans are a common resource and marine litter is a transboundary problem. The more countries that ban microbeads the greater the reduction in marine litter inputs into the world's seas. This benefit cannot be quantified at this stage.

### 7.2. Environmental benefits

The evidence base on the effects of microplastics, including microbeads, in the marine environment is limited. However there is evidence of numerous potential effects caused by the plastic polymer itself, by the additives it contains, or by other chemicals which are known to associate with microplastics once they are in the ocean. The United Nations advisory body, the Joint Group of Experts on the Scientific Aspects of Marine Environmental Pollution (GESAMP) reviewed the evidence on microplastics, such as microbeads, in 2015 and concluded that the ingestion of microplastics may have an effect on the feeding, movement, growth and breeding success of the host organism in a range of species.

A Defra funded project undertaken by the University of Plymouth showed microplastics can accumulate pollutants from seawater and transfer them to the guts of marine organisms. Microplastics can cause physical harm to marine organisms and can transfer along a simple food chain.

There are also potential environmental effects of microplastics that are not related to the ingestion of these particles by animals or algae. For example the colonisation of microplastics could be a means for invasive non-indigenous species to spread to new areas. The presence of high concentrations of microplastics in beach sediments can change their permeability and heat absorbance, potentially affecting species where gender is determined by temperature (e.g. sea turtles) and sediment dwelling species that might be at a higher risk of desiccation (e.g. worms, crustaceans, and molluscs).

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<sup>22</sup> The stated preference study and corresponding analysis was carried out by a masters student at LSE, with guidance from a supervisor from LSE as well as a representative from the Dossier Submitter team

<sup>23</sup> <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/environmental-impact-of-microplastics/oral/33831.pdf>

There are also other stresses experienced by marine organisms including other forms of historical pollution and ocean acidification. Adding stresses from microbeads increases the overall risk to marine ecosystems. The microbead ban is therefore expected to have a positive impact on the marine environment as it will reduce the overall microplastic load and the potential for these effects.

Alternatives to microbeads should be assessed by producers to ensure they do not have significant environmental impacts.

A valuation study conducted by EFTEC in 2002<sup>24</sup> on benefits of revised Bathing Water Quality Directive, reported that respondents were willing to pay between about £6 and £11 per household per year for avoiding the presence of some litter / dog mess on the beach. This equates to a minimum of £144 million per year for England and Wales. Whilst the objective and the context of the above study are quite different from the microbeads issue, it can be indirectly inferred that society have a high willingness to pay for removing litter in the marine environment.

However, since both the scientific and the economic evidence on this particular area is very limited the environmental benefit of banning microbeads has not been quantified at this stage. No significant evidence was provided during the consultation.

While the net impact of the microbead ban is expected to be positive, no benefits have been quantified at this stage. A summary of monetised costs is to be found in section 13.

### **7.3 Key Assumptions and Risks**

Assumptions made have been included throughout this assessment where relevant. Key assumptions have been highlighted below. No significant responses were received during the consultation to challenge these assumptions so they remain unchanged.

The baseline assumes that under the voluntary approach, there would be no change in microbead use over the 10 year appraisal period. Since manufacturers would be unlikely to continue to use microbeads in the same quantity throughout the period (it seems likely that consumer pressure would lead to further reductions) this can be seen as a conservative estimate.

Based on industry feedback, we have assumed no additional cost to the cosmetics industry from product reformulation or relabelling. More information on this assumption is found in section 8.

We have made various assumptions in order to calculate our best estimate of the cost of replacing microbeads with a benign alternative:

- Products containing microbeads are likely to be aimed at the mass market, and are therefore assumed to be below average cost.
- An equal weight of silica and microbeads serve the same function.
- Products containing microbeads sell on average as well as products that do not contain microbeads.
- All microbeads used in cosmetics can be replaced with silica.
- Cosmetics manufacturers are able to source a stable supply of silica at a price of £8 per kilo.
- Cosmetics listed on the Beat the microbead website are a representative cross-section of the industry segments in question.

A sensitivity test has been carried out around this key set of assumptions. More information is found in section 8.

Since silica is denser than water, there is a risk that over time there could be an increase in the build-up of silica in household drains, leading to blockages. However no evidence of this was supplied during the consultation.

Cosmetics manufacturers are assumed not to invest in additional capital in order to replace microbeads.

There are assumed to be no shelf life, stability of supply, or demand effects. More information is found in section 10.

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<sup>24</sup> EFTEC report, Valuation of Benefits to England and Wales of a Revised Bathing Water Quality Directive and Other Beach Characteristics Using the Choice Experiment Methodology, 2002

More information on the assumptions made to calculate enforcement costs is found in section 11. A sensitivity test has been carried out around our best estimate of the enforcement costs involved.

## **8. Wider impacts**

### **8.1. Small firms impact test**

The UK Cosmetics Toiletry and Perfumery Association confirmed that microbeads are almost exclusively used by larger companies (based on engagement with their members and experience of the industry as a whole). The impact on small companies is therefore expected to be minimal.

### **8.2. One In, Two Out (OITO)**

This measure to ban microbeads from cosmetic and personal care products is in scope of OITO. It is a regulatory measure for which the monetised benefits to business are less than the monetised costs and therefore takes an IN status. We estimate that the policy generates an annual net cost to business of £0.5m.

### **8.3. Business Impact Target score**

The EANDCB calculator gives an equivalent annual direct cost to (UK) business of £0.4m (2014 prices, 2015 present value) and a Business Impact Target score of 2.0.