

Title: Regulatory Triage Assessment on the proposal to ban the sale and supply of plastic-stemmed cotton buds in England IA No: Defra/ENV/021 RPC Reference No: 4315 Lead department or agency: Department for Environment, Food and Rural Affairs (Defra) Other departments or agencies: N/A	Regulatory Triage Assessment (RTA)			
	Date: 01/05/2020			
	Stage: Post-consultation			
	Source of intervention: Domestic			
	Type of measure: Secondary legislation			
	Contact for enquiries: Dan Quinlan or Raminta Brazinskaite			
RPC Opinion: Fit for purpose				

Summary: Intervention and Options

Cost of Preferred Option (in 2019 prices, 2020 present value)			
Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status
£1.35m	-£0.11m	£0.01m	Non qualifying provision

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

Plastic stemmed cotton buds are not suitable for re-use and can cause multiple environmental harms particularly when they are discarded incorrectly, including harm to wildlife and visual pollution. Even if disposed of correctly, plastic stemmed cotton buds may end up in incineration, generating high carbon emissions. These are negative externalities as they are experienced across society and are not accounted for within market prices. Moving consumption to plastic free alternatives will reduce these negative externalities. Therefore, intervention is required in order to shift the cotton bud market to plastic-free alternatives that already exist and decompose much quicker.

What are the policy objectives and the intended effects?

The objective is to help protect our environment for the future generations, improve the quality of the environment and reduce harm to human health and wildlife. The ban is intended to ensure that cotton buds are made of materials that will decompose quickly and will have low life-cycle impacts on the environment. The ban may also encourage businesses to invest in biodegradable alternatives to plastic. Furthermore, the ban intends to increase consumer awareness of the environmental harms cotton buds can cause when they are not correctly disposed of, and to signal Government's intent to reduce unnecessary plastic waste.

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

The options considered for consultation are 'do nothing' (option 0) and a ban on plastic cotton buds in England (option 1, preferred). A ban in October 2020 is preferred as it would have the maximum impact in reducing the social costs of plastic stemmed cotton buds. Alternative options such as taxes, information campaigns and making plastic buds available in stores by request were rejected as they would not be as effective as a ban in reducing the social costs of plastic stemmed cotton buds, and they would likely have higher costs than a ban. Given the international production of cotton buds, and evidence that familiarisation and administration costs are expected to be minimal, we have put a conservative estimate of £0.1m pa cost to business. The ban will include an exemption for plastic-stemmed cotton buds required for scientific purposes.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 5 years post implementation

Does implementation go beyond minimum EU requirements?	Yes			
Is this measure likely to impact on trade and investment?	No			
Are any of these organisations in scope?	Micro Yes	Small Yes	Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)	Traded:		Non-traded: -0.00004	

I have read the Regulatory Triage 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 REBECCA POW

Date: 4 JUNE 2020

Summary: Analysis & Evidence

Policy Option 1

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2020	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £-0.155	High: £2.875	Best Estimate: £1.295

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£0.10	£0.03	£0.316
High	£0.10	£0.05	£0.529
Best Estimate	£0.10	£0.04	£0.422

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

We have monetised the cost of additional emissions expected from paper stemmed cotton buds (the expected substitute for plastic stemmed cotton buds) that are sent to landfill, as plastic emits less carbon dioxide equivalent (CO₂ e) emissions when placed in landfill relative to paper. There will be an additional waste management cost – which mainly falls to local authorities - as paper cotton buds are heavier than plastic. We have also monetised an annual cost for enforcement agencies, and a small additional fuel cost and associated carbon costs to businesses.

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

Some consumers may lose out if they prefer plastic stemmed cotton buds. Any costs to English businesses are assumed to be negligible, as cotton buds are predominantly imported and paper stemmed cotton buds are already being sold at comparable prices.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0.00	£0.04	£0.373
High	£0.00	£0.35	£3.191
Best Estimate	£0.00	£0.19	£1.717

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

As paper decomposes much quicker than plastic, we expect to see a reduction in the presence of litter on beaches. Plastic stemmed cotton buds are particularly present on beach environments, but clean beaches are highly valued by the public. Alternatively made cotton buds (expected to become paper based) are cleaner to incinerate than plastic buds, resulting in environmental savings. There is also an increase in landfill tax revenue caused by the heavier paper cotton buds.

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

Cotton buds contribute to marine litter which impacts wildlife as materials can entangle or be ingested by marine wildlife, causing injury and loss of life to marine animals. Marine litter has a disamenity cost, affecting pristine seascapes and quality of life which impacts those who use marine environments and also impacts those who value knowing that there is a pleasant environment available to them and to others.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5%

We have assumed that many retailers will switch away from plastic stemmed cotton buds regardless of the ban. If this assumption proved wrong, it would increase the net positive impact of the ban. We have assumed that paper will be the replacement material. There is a risk that this proves partially inaccurate, but other alternatives such as wood are likely to have similar environmental and economic advantages relative to plastic.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:	Score for Business Impact Target (qualifying provisions only) £m:		
Costs: £0.01	Benefits: £0	Net: £0.01	

			Not applicable, low-cost measure
--	--	--	----------------------------------

Evidence Base (for summary sheets)

Problem under consideration

Plastic stemmed cotton buds are contributing to the global marine plastic problem, damaging the marine environment and posing a risk to wildlife. It is estimated that there are over 150 million tonnes of plastic in the world's oceans and every year one million birds and over 100,000 sea mammals die from eating and getting tangled in plastic waste¹.

Cotton buds are single-use products used in the home for hygiene purposes such as first aid, makeup application and arts and crafts. Plastic stemmed cotton buds have a polypropylene stem and use a plastic-based adhesive to attach a small ball (bud) of cotton wool to each end of the stem.

Cotton buds are prone to being disposed of incorrectly as they are typically used in domestic bathrooms. They are also difficult to recycle and generally are not accepted in recycling collections². Research commissioned by Defra to the consultancy Resource Futures estimated that 8.1% of cotton buds are flushed down the toilet³, and we have assumed the remaining 91.9% end up being collected for landfill or incineration. Once flushed, their small size means sewage treatment works cannot easily prevent buds from reaching the sea. Sewerage infrastructure is not effective at capturing these items and during rainstorms, plastics can be discharged into rivers and the sea via storm sewer outlets.

It is estimated that 1.8 billion stemmed cotton buds are consumed in England each year⁴. The Marine Conservation Society has been monitoring the levels of cotton buds found on beaches in the UK since 2004. They continue to feature in the top ten most common marine litter items in beach clean surveys with an average of 27 found for every 100m of beach surveyed in 2017⁵. Single use plastics, including plastic stemmed cotton buds, are associated with negative effects on the environment. High levels of greenhouse gas emissions are also associated with plastics production since they are oil based. Once made, plastic stem cotton buds have impacts on land and in seas and rivers if they are littered or discarded incorrectly after their use. There are costs associated with their clean-up and externality costs imposed on the tourism and fishing industries from littering and the transfer of littered plastics into the environment. They can damage terrestrial and marine life and there is widespread and significant public concern regarding plastics and litter. All of these impacts contribute towards negative well-being. It is not hygienic to re-use a single-use cotton buds and, if they are not properly disposed of, they can contribute towards these social costs over a long period of time because plastics can take 300 years to decompose⁶.

Rationale for Intervention

Plastic stemmed cotton buds are not suitable for re-use and contribute to multiple negative externalities. They are not commonly recycled due to the effort required to segregate and clean them. Also, their small size and flexibility means that they are more likely to fall between recycling machinery. Most plastic stemmed cotton buds will therefore end up either being incinerated for energy, or sent to landfill. A proportion are also estimated to be flushed down the toilet and reach the sea, causing damage to the marine environment and wildlife. Plastic cotton-buds therefore impose costs on society when disposed of, including harms to animals and visual litter pollution, both of which have a negative well-being impact on people.

The social and environmental costs are not accounted for within the market price of plastic stemmed cotton buds. This means that businesses and end-consumers are not currently incentivised to limit the

¹ <https://www.wwf.org.au/news/blogs/plastic-in-our-oceans-is-killing-marine-mammals#gs.2hijex>

² <https://www.recyclenow.com/what-to-do-with/cotton-buds>

³ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

⁴ Estimate by Resource Futures, based on evidence from a major retailer and from the British Retail Consortium.

⁵ [Seas at Risk](#) – Eunomia: Leverage Points for Reducing Single-use Plastics

⁶ Taking an average based on estimates of 200 years from WWF, The Life Cycle of Plastics and 400 years from Wessex Water.

use and disposal of plastic stemmed cotton buds appropriately, or to switch to cotton buds made of less environmentally harmful materials.

For example, cotton-buds made with a paper stem are available at a comparable price and performance. Paper releases less carbon dioxide emissions when incinerated, and paper stems swell upon contact with water, so if disposed of inappropriately by flushing or littering, these cotton buds are less likely to reach the sea. If they do, they biodegrade at a significantly faster rate than plastic and therefore pose less risk to marine wildlife.

The US market is dominated by Q-TIP cotton swabs with paper-based stems, and alternatives to plastic buds are being sold across Europe⁷. Brand manufacturers such as Johnson and Johnson now produce paper-based buds⁸ and many retailers including Sainsbury's⁹, Tesco, Aldi and more have voluntarily committed to providing them to consumers¹⁰. Given these voluntary commitments have been made, part of the rationale for the ban is to ensure that these commitments are adhered to, and to ensure that the rest of the market follows suit because of the environmental benefits to society it brings.

Intervention in the market will help to ensure businesses and consumers can make well informed decisions that account for the negative impacts of plastic stemmed cotton bud use. It is also expected to support those businesses who have already invested in alternatives to plastic cotton buds, and to encourage businesses to continue to invest in alternative materials to plastic in the future.

A research report commissioned by Defra to Resource Futures looks at the current market trend, and estimates that plastic cotton buds usage is likely to decrease regardless of a ban being implemented, based on the current rate of business switching. If this rate continues, then plastic cotton bud usage is likely to reach very low levels by 2025/26 (see Figure 1). However, despite the predicted trend, there is a rationale for government to intervene to ban these items ahead of that time in order to address the negative environmental effects these items have on the environment as soon as possible. In addition, it is important to note that the projected trends are estimates, and there is no guarantee that plastic stemmed cotton bud usage will decrease by as much as predicted, or be sustained into the future.

The ban on straws, cotton buds and drink stirrers is in line with the EU Single-Use Plastics (SUP) Directive, which are bringing their regulations into force in July 2021. Having left the EU, the UK is not legally obliged to meet the SUP directive, however we are focused on matching and exceeding the ambition of the Directive in ways that work best for us. Government action to ban the supply of these items to the end user, with exemptions where alternatives are not readily available, means that the change needed to reduce harmful and unnecessary plastic pollution is secured more widely (both domestically and internationally). Although cotton buds make up 3.7% of marine litter by item count, when viewed in tandem with policies to ban plastic straws and drink stirrers, the cumulative impact of the bans is highlighted as it is estimated that all three items together contribute around 5.7%.

Consultation support for a ban: In addition to the above, consultation responses showed significant support for this intervention, with 89% of 1,420 respondents supporting the ban. Only 3% of respondents did not support the ban. Many responses highlighted harm to the environment/wildlife, the potential for inappropriate disposal, and the availability of functional alternatives as the primary reasons.

Policy objective

The objective is to help protect our environment for the future generations, improve the quality of the environment and reduce harm to human health and wildlife. The ban forms part of the wider UK Government's 25 Year Environment Plan¹¹ to improve the environment. The plan has specific commitments to eliminate 'avoidable' plastic waste by the end of 2042 and a target to significantly reduce and where possible prevent all kinds of marine plastic pollution.

⁷ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

⁸ <https://www.cottonbudproject.org.uk/news/item/63-johnsons-paper-cotton-bud.html>

⁹ Sainsbury's: <https://www.about.sainsburys.co.uk/news/latest-news/2017/22-02-2017>

¹⁰ <https://www.citytosea.org.uk/seven-major-retailers-pledge-to-switch-the-stick-to-stop-source-of-plastic-pollution>

¹¹ [A Green Future: Our 25 Year Plan to Improve the Environment](#)

The government published its Resources and Waste Strategy¹² in December 2018. The strategy aims to make the UK a world leader in resource efficiency and resource productivity. It sets out how we will work towards our ambitions of doubling resource productivity and achieving zero avoidable waste by 2050, maximising the value we extract from our resources and minimising the negative environmental impacts associated with their production, use and disposal. Single use plastics, including plastic stemmed cotton buds, plastic drinking straws and plastic drinks stirrers, are associated with negative effects on the environment if they are littered or discarded incorrectly after their use. The government has committed to ban plastic products where there is a clear case for it and alternatives exist.

The ban is intended to ensure that cotton buds sold in England are made of less environmentally harmful materials that will decompose quicker and will have lower life-cycle impacts on the environment. The ban may also encourage businesses to invest in biodegradable alternatives to plastic. It is also intended that banning plastic stemmed cotton buds will foster an increased degree of consumer confidence that the products they buy will not harm wildlife and the environment, and will also increase consumer awareness of the environmental harm cotton buds can cause when they are not correctly disposed of.

The ban is also intended to ensure that suitable exemptions are in place where alternatives to plastic stemmed cotton buds for use in scientific laboratories are not readily available.

Changes made to this analysis following consultation:

- The implementation date for the ban on plastic stemmed cotton-buds has been moved from October 2019 (and subsequently from April 2020) to October 2020, in line with Government's official response to the consultation and the Covid-19 outbreak.
- The analysis now incorporates enforcement costs for the regulating authority¹³.
- The assumption of small/negligible overall cost to business was tested and supported at consultation. We have conservatively assumed that there will be a one-off familiarisation cost of £0.1m to businesses¹⁴.
- We have also monetised an additional cost associated with waste management, which mainly falls to local authorities. We expect local authorities and businesses to bear 90% and 10% respectively of the additional cost¹⁵.
- The RTA no longer includes carbon emission savings from production, as the majority of production (95%)¹⁶ occurs abroad so is not included in UK production emission savings.
- Consultation evidence has been incorporated throughout, refining and justifying assumptions.
- Further detail on medical/scientific exemptions are provided, in line with Government's response to the consultation.

In addition to the consultation responses, a number of evidence points have been sourced from research undertaken by the consultancy Resource Futures for Defra. This research was conducted between March and April 2018 to specifically develop understanding of the markets for plastic straws, drinks stirrers and plastic-stemmed cotton buds, and the potential impacts of bans. This included engagement with key stakeholders, an evidence review and preliminary impact modelling. Evidence from this research has been combined with stakeholder engagement, Defra research and consultation responses. Given that the cotton buds market is relatively small, there is limited evidence available. A Defra commissioned research was necessary and is referenced frequently throughout this analysis.

Options under consideration

¹² <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

¹³ Sourced from Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

¹⁴ [Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.](#)

¹⁵ Defra's estimate based on the Resource Futures report

¹⁶ [Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.](#)

This analysis presents two options for consideration. **The preferred option is to ban plastic stemmed cotton buds in October 2020, with exemption for scientific purposes.** A ban will be the most effective option to reduce the social and environmental costs associated with plastic stemmed cotton buds.

Option 0: Do nothing

The **do nothing** option would allow plastic stemmed cotton buds to continue being used with little incentive for consumers to switch products. The costs and benefits of this option is zero against the baseline. Some businesses are voluntarily moving away from plastic stemmed cotton buds and this is factored into the do nothing scenario.

The problem associated with this option is that relying on voluntary reduction in plastic stemmed cotton bud use will mean that reduction is not guaranteed, will happen at a slower rate, and that there will still be a percentage that will continue to be used and disposed of. This means that the environmental costs associated with plastic stemmed cotton buds will continue to persist into the future.

Option 1: Implement a regulatory ban of plastic stemmed cotton buds in England from October 2020 (preferred option)

The preferred option is to ban plastic stemmed cotton buds, with the exception of those plastic-stemmed cotton buds required for scientific purposes. This exemption is to allow for testing laboratories (such as the Home Office DNA testing labs) to continue to run specialist equipment that cannot cope with paper stemmed buds without vast expense and disproportionate upgrade costs. The small proportion of cotton buds used in this environment are expected to be disposed of appropriately, and are very unlikely to be littered. This option would be the most effective to reduce the social and environmental costs associated with cotton buds, whilst allowing for use within medical practice and forensic science provision.

The availability of alternative cotton buds at a comparable price, and commitments already made voluntarily by retailers to switch away from plastic suggests that switching costs would be small. The preferred option seeks to implement a ban by October 2020.

The impacts of a ban are proportionate to secure the environmental benefits without any major costs given the current trend in the market to move away from plastic stemmed cotton buds. As described in the rationale for intervention section, this intervention will secure the change and associated environmental benefits more quickly, and ensure that these are sustained into the future. The ban will foster an increased degree of consumer confidence that the products they buy will minimise harm to wildlife and the environment, and will also increase consumer awareness of the environmental harms cotton buds can cause when they are not correctly disposed of.

Disregarded options

The following options were considered but most were rejected as they would not reduce the impacts to the environment in the same speed and scale as a ban would.

Information and education could be used to encourage firms and consumers to move away from plastic stemmed cotton buds. However there is evidence that consumers are already acutely aware of the harms of single-use plastics, with multiple campaigns in recent times including the BBC's 'Blue Planet II' series, Daily Mail's 'Break the Habit, Turn the Tide on Plastic' and the 'Stir-Crazy Campaign', as well as the carrier-bag 5p charge in supermarkets. The additional impact of further information being provided on top of these campaigns may be marginal and is unlikely to eliminate the use of plastic-stemmed cotton buds.

Request only option - plastic stemmed cotton buds could be made available by request only e.g. available only behind the counter. However, this may cause inconvenience to businesses and consumers and the impacts in reducing usage would be less than a ban and would be less certain than a ban.

Subsidies towards the development of non-plastic stemmed cotton bud alternatives are not considered necessary as suitable non-plastic stemmed cotton buds have already been developed and are available at the same market price.

A taxation or charge policy was rejected, as although this would likely be effective in reducing consumption, it would not be as effective as a ban. Taxation and charge policy instruments can be effective in reducing plastic, for example, the 5p charge on single use plastic carrier bags delivered significant behaviour change, with data showing an 86% drop in the number of single use plastic carrier bags between 2014 and 2017/18¹⁷, and Government is consulting on the introduction of a tax on plastic packaging with less than 30% recycled content and has a planned implementation date of 2022. However, in this case, a ban was chosen as the most appropriate instrument to achieve the maximum environmental benefits because single-use plastic cotton buds are deemed as avoidable plastic, which cause environmental harm and are easily replaceable. Furthermore, a taxation or charge would place an additional financial burden on businesses which could be passed on to consumers. The consultation responses agreed with that rationale.

In addition, it is worth noting that a ban on plastic cotton buds is not the only Government intervention in addressing the environmental impacts of the waste we produce, and this measure should be viewed as part of a wider package of reforms, which used different policy instruments, in the Resources and Waste Strategy.

Alternatives to plastic stemmed cotton buds

A standard concern with banning a consumer product is a lack of suitable alternatives. This is not expected to be the case as a number of alternative materials for cotton bud stems already exist. There are companies that produce reusable sticks for cleaning ears. Paper and wood stemmed substitutes are now commercially available and are the 'market norm' in the USA¹⁸. Bamboo cotton sticks are also available to UK consumers.

Brand manufacturers such as Johnson and Johnson now produce paper-based buds¹⁹ and many retailers including Sainsbury's²⁰, Tesco, Aldi and more have committed to providing them to consumers²¹. Given the commitments that have been made by a number of UK retailers towards switching to paper based cotton buds, for simplicity this analysis assumes that paper cotton buds will replace plastic cotton buds following a plastic ban.

The estimates in this analysis are not sensitive to this assumption. Other alternatives, such as wood stemmed cotton buds may lead to even greater environmental benefits, as compared to paper, wood reduces carbon emissions in production, incineration and landfill. Therefore the net present values in this IA should be considered as a conservative possible scenario.

Summary of Impacts and NPVs – Preferred Option

Table 1 below gives a summary of the monetised costs and benefits and total Net Present Value (NPV) estimates for the preferred option to ban plastic stemmed cotton buds, compared to what we believe would happen if there were no government intervention (i.e. under the 'do nothing' option). The central NPV estimate is £1.3m, with the largest contributor coming from an amenity value estimate resulting from there being less litter on beaches.

¹⁷ [Single-use plastic carrier bags charge: data in England for 2017 to 2018](#)

¹⁸ [European Commission](#): Commission Staff Working Document, Impact Assessment. Reducing marine Litter: action on single use plastics and fishing gear. Impact assessment Part 3.

¹⁹ <https://www.cottonbudproject.org.uk/news/item/63-johnsons-paper-cotton-bud.html>

²⁰ Sainsbury's: <https://www.about.sainsburys.co.uk/news/latest-news/2017/22-02-2017>

²¹ <https://www.citytosea.org.uk/seven-major-retailers-pledge-to-switch-the-stick-to-stop-source-of-plastic-pollution>

Table 1 - Summary		10 Year NPV estimates, £m:		
		Low	Central	High
Benefits	Disposal incineration emission benefit	£0.003	£0.004	£0.004
	Landfill tax revenue*	£0.001	£0.001	£0.001
	Reduced coastal clean-up costs	£0.04	£0.12	£0.18
	Beach quality amenity benefit	£0.33	£1.59	£3.01
Costs	Disposal landfill emission cost	-£0.002	-£0.002	-£0.002
	Waste management cost to business	-£0.001	-£0.001	£0.000
	Waste management cost to LAs	-£0.006	-£0.005	-£0.004
	Enforcement cost	-£0.42	-£0.31	-£0.21
	Business implementation cost	-£0.10	-£0.10	-£0.10
	Fuel cost**	-£0.001	-£0.001	£0.000
	Fuel emissions cost	£0.000	£0.000	£0.000
	Total	-£0.16	£1.30	£2.88

*Note that the landfill tax revenue represents a transfer of money between relevant parties. It is an additional revenue to Government and a cost to businesses and local authorities. This means that we have used the same estimates for each scenario in our NPV calculations.

** The fuel emissions cost only appear to be zero due to rounding.

All figures are in 2017 prices. The range between the low and high estimates reflects the estimate range of uncertainty for the number of cotton buds consumed in England, how long buds of different materials take to decompose, the proportion that end up on beaches and differing values placed on having cleaner beaches.

All of the impacts that have been monetised are impacts to society as a whole, as due to their nature it would not be appropriate to apportion them to specific groups of the population.

Counterfactual

In order to assess the costs and benefits of the preferred option to ban plastic stemmed cotton buds in October 2020, we have set out what we believe would happen to the cotton bud market if there were no ban at all (i.e. we 'do nothing'). Currently 1.8 billion cotton buds are consumed in England each year²², and until recently almost all of these would likely have been plastic based. It would be unrealistic to assume that the consumption of plastic stemmed cotton buds will continue to be this high under the 'do nothing' scenario as the cotton buds market has already begun moving towards paper-based cotton buds (away from plastic stemmed cotton buds).

The scale of the costs and benefits of the ban are sensitive to the number and size of retailers that 'switch the stick' voluntarily, and the time it would take them to switch without the ban in place. A limitation of this analysis is that the status quo for cotton buds being plastic is currently changing and it is very difficult to predict what the market will do if no ban on plastic button buds were imposed.

A significant number of retailers have already made voluntary commitments to 'switch the stick'. A number of retailers already offer paper-based alternatives, including major retailers Marks & Spencer's, John Lewis, The Body Shop, and Co-operative²³, while many more major retailers followed in the "switch

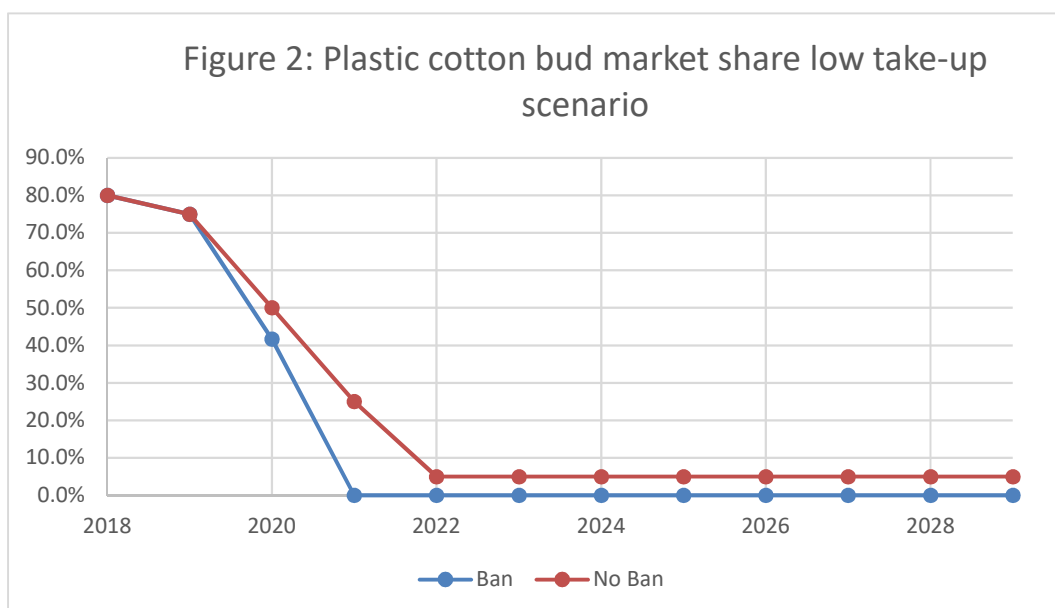
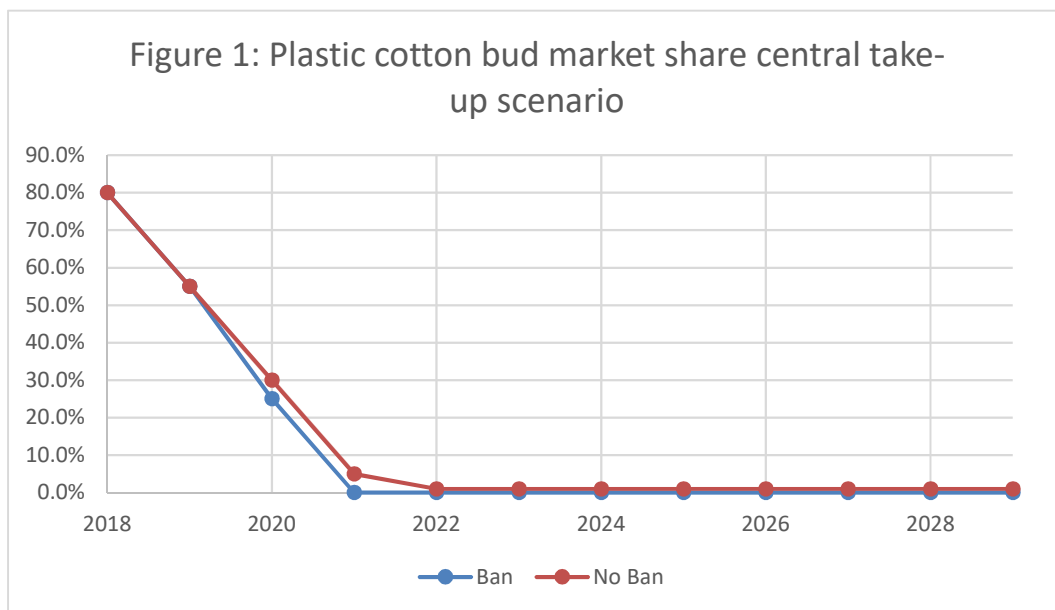
²² Estimate by Resource Futures, based on evidence from a major retailer and from the British Retail Consortium.

²³ [Regional Activity Centre for Sustainable Consumption and Production](#): 25 innovative and inspiring solutions to combat PLASTIC MARINE LITTER in the Mediterranean Region

the stick” campaign²⁴²⁵. There is some uncertainty over what proportion of cotton buds being sold today are plastic based, but a significant proportion are already likely to be paper-based and there is a continuing movement towards paper-based cotton buds. If we did assume that plastic stemmed cotton bud consumption remained high without a ban, this would likely overstate the value of the net benefits a ban would bring, and so we have attempted to model what would happen to cotton buds without a ban.

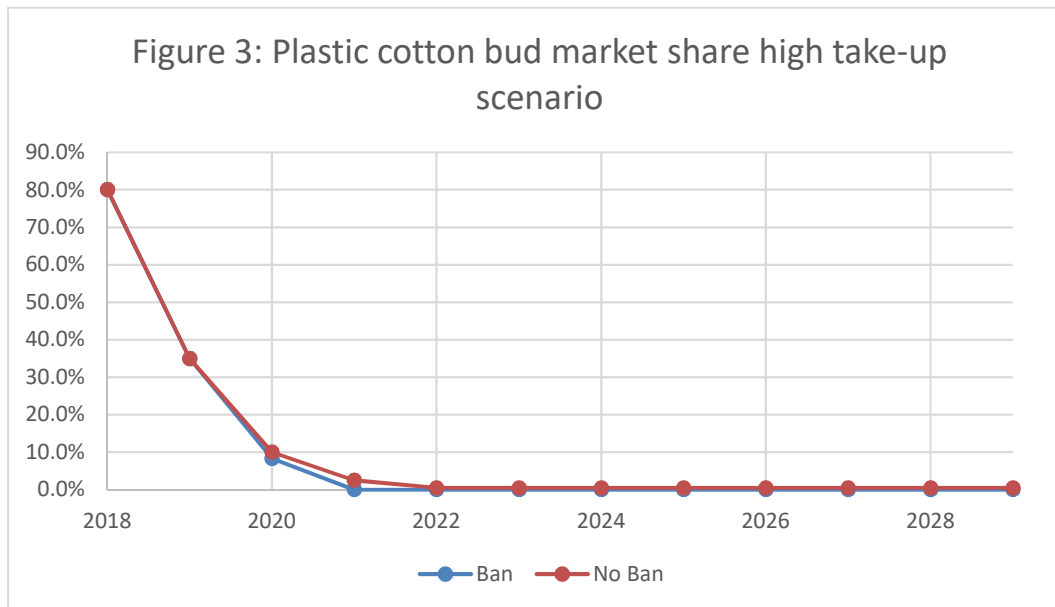
Scenario Analysis

In order to allow for the evidence gap in forecasting what would happen to plastic stemmed cotton buds without a ban, we have modelled three scenarios for take up of alternatively made cotton buds in the ‘do nothing’ (no-ban) scenario and compared these against the ‘ban’ scenario, all of which are shown in the graph below and in table format in Annex 1. They show the percentage of the market share forecast to still be plastic over the next 10 years. The counterfactual described in the ‘no ban central’ scenario has been used to calculate the net present values in Table 1.



²⁴ <https://www.citytosea.org.uk/seven-major-retailers-pledge-to-switch-the-stick-to-stop-source-of-plastic-pollution/>

²⁵ <https://www.citytosea.org.uk/all-plastic-cotton-buds-banned-after-successful-switchthestick-campaign/>



The 'ban' and 'no ban central' scenarios are based on modelling estimates made by Resource Futures. High and low sensitivities reflect the uncertainty of this forecast. The differences in the scenarios start from 2020 as the ban is planned to be enacted October 2020.

In the absence of actual market data, we have assumed that in 2018 80% of cotton buds consumed were plastic based. This was informed by the Resource Futures evidence review and stakeholder interviews. Their research found that many large retailers were announcing switching to plastic-free alternatives at the time the research was conducted. The current observed trends were projected to continue, with the assumption that this would be in a linear fashion. This is recognised as a simplified representation of the market, and in reality it is likely that switching would occur in a non-linear fashion, however, it is difficult to provide a robust forecast of this. The scenarios have been utilised for modelling purposes in order to provide a comparison for the "ban" scenario, where market-driven change is implemented earlier and faster, to avoid overstating the impacts of the regulation. These projections are inevitably uncertain, and therefore sensitivity analysis around the central scenario has been undertaken to explore this risk.

In the ban scenario, the market share of plastic cotton buds will be 10/12ths of the no ban scenario market share in 2020 (representing the 10/12ths of the year before the ban is implemented), falling to 0% after the implementation of the ban. The plastic market share from medical and forensic uses are negligible and therefore aren't modelled. Paper based cotton buds are assumed to replace the market share of plastic. In the 'no ban high' take up of alternatively made cotton buds scenario a near-zero state is reached by 2022. The 'no ban central' and 'no ban low' take up scenarios follow similar paths but each with slightly higher proportions of plastic stemmed cotton buds throughout.

The difference between the 'ban' and 'no ban central' scenario is used to calculate the final 10 year net present value (NPV) estimate in this analysis. The NPV of introducing a ban is highest in the 'low take-up' scenario, which reflects the fact that the ban would have the biggest impact if society is assumed to remain using plastic cotton buds at a higher rate without government intervention. Table 2 below provides a sensitivity analysis to show how the 10 year NPV would change across the different 'no ban' scenarios:

Table 2 - Scenarios for plastic take up if there were no ban:	10 Year NPV estimates:		
	Low	Central	High
Central Scenario NPVs	-£0.16	£1.30	£2.88
Low take up Scenario NPVs	£0.93	£6.40	£12.39
High take up Scenario NPVs	-£0.36	£0.35	£1.12

The estimates in Table 2 are calculated by taking the 10 year net present value totals for the low, central and high scenarios, and then multiplying the impacts by the percentage point difference of cotton buds expected to be plastic between the 'ban scenario' and each 'no ban' scenarios.

All of the 'no ban' scenarios are similar in that they suggest that the vast majority of the market for cotton buds will soon move away from plastic towards paper instead. This limits the scope of the costs and benefits in this impact assessment significantly. This is a conservative approach, as Table 2 shows that if we assumed that plastic retained a greater market share (i.e. the low take up scenario) then the ban would have greater net benefits, resulting in higher net present value estimates.

Costs

The costs of a ban on plastic stemmed cotton buds include landfill disposal emission costs, additional waste management costs, enforcement and monitoring costs, a one off business implementation cost, fuel costs and fuel emissions costs.

Summary of Monetised Costs

Table 3 shows the monetised costs, with our central total present value (TPV) estimate over 10 years being £0.42m. There are seven monetised costs: the additional emissions expected from the disposal of paper-based cotton buds, the additional waste management costs to businesses and local authorities, enforcement costs to the regulatory authority, a one off business implementation cost, the cost to business of additional fuel use as plastic alternatives are heavier and the associated fuel emissions costs to society. Based on research by Resource Futures, it is assumed that the additional switching cost to business from introducing the ban is negligible. This is because the baseline scenario models a high level of switching without the ban.

Table 3	10 Year NPV estimates, £m:		
	Low (worst case)	Central	High (best case)
Total Costs:			
Disposal landfill emission cost	-£0.002	-£0.002	-£0.002
Waste management cost to business	-£0.001	-£0.001	£0.000
Waste management cost to LAs	-£0.006	-£0.005	-£0.004
Enforcement cost	-£0.419	-£0.314	-£0.209
Business implementation cost	-£0.100	-£0.100	-£0.100
Fuel cost	-£0.001	-£0.001	£0.000
Fuel emissions cost*	£0.000	£0.000	£0.000
Total Costs:	-£0.529	-£0.422	-£0.316

*Note that fuel emissions cost only appears to be zero due to rounding.

Summary of Non-monetised Costs

Switching materials may create costs for individual producers, but very few buds are produced in the UK and therefore any such costs would be out of scope of this analysis. As prices for paper buds are already comparable to plastic buds, this also suggests that there will be no costs passed onto retailers (or to consumers to absorb). There may be a disutility cost to consumers having to use paper buds when they may have preferred plastic buds, no evidence was put forward during the consultation to suggest this.

The monetised and non-monetised costs will be presented side-by-side in this section, grouped under the following headings:

- Environmental emissions
- Monitoring and enforcement
- Costs to businesses and local authorities
- Costs to consumers

Environmental Landfill Emission Cost

Relative to plastic, paper emits more carbon dioxide equivalent (CO₂ e) emissions when placed in landfill (1,033kg CO₂ e per tonne of paper, in comparison to just 9kg CO₂ e per tonne of plastic polypropylene). Evidence suggests that the majority of cotton buds are not recycled²⁶. It also suggests that for waste that goes to landfill, plastic performs better than paper due to more CO₂ e emissions released by paper in landfill. Given that each tonne of CO₂e has an environmental cost associated with it, this causes paper based alternatives to have an element of a negative contribution towards the environment.

Monetisation and Assumptions

We have monetised this cost using the following figures and assumptions:

- 1.8 billion cotton buds are consumed in England each year²⁷. We assumed 1.6 billion for our low estimate and 2 billion for our high estimate.
- Paper cotton buds weigh 0.44g, compared to 0.25g per unit for plastic stemmed cotton buds²⁸, and the stem makes up 75% of the weight for plastic, and 86%²⁹ of the weight for paper buds.
- For each tonne of material placed in landfill, plastic polypropylene emits 0.009kg of CO₂ e, whereas paper production emits 1.033kg³⁰. It is possible that there are impacts of plastic landfill disposal that are not included within the 0.009kg estimate as plastic has not been around for as long as its own estimated decomposition rate, but this would only serve to reduce the emission cost of switching materials.
- We assume that the cost of one tonne of CO₂ e in 2020 is £68.08, which increases up to £79.43 in 2030³¹.
- 91.9% of cotton buds are given to waste, or are littered and then collected by local authorities. This is an estimate based on 8.1% being disposed of down the toilet³² and an assumption that zero cotton buds are recycled. The zero recycling assumption is based on the majority of cotton buds being disposed of in bathrooms where there is rarely any recycling. This assumption is also to give a conservative estimate. If any cotton buds were recycled paper buds would then emit

²⁶ Confirmed via Defra discussion with recycling and recovery industry stakeholder when talking about straws, responsible for significant share of the waste management market. We assume this will be the same for cotton buds given their similar shape and size.

²⁷ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

²⁸ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

²⁹ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

³⁰ Government conversion factors. Spreadsheet used [here](#), which underpins published [government gas reporting figures](#).

³¹ Green Book Supplementary [Guidance from BEIS](#), which states that emissions for landfill should use non-traded values.

³² Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

fewer carbon equivalent emissions than plastic buds³³, leading to a higher NPV for the policy to ban plastic stemmed cotton buds.

- 29% of the 91.9% of cotton buds collected by local authorities are sent to landfill³⁴.
- These assumptions are used to compare the scenarios where differing proportions of cotton buds are modelled to be plastic vs. paper – see page 8.
- When comparing the central “no ban” scenario to the ban scenario, we see an additional net cost of £2,153 over the ten-year appraisal period due to the higher number of paper-stemmed buds.

It is assumed above that 8.1% of cotton buds end up in the marine environment. There will be emissions costs associated with an increased number of paper-stemmed cotton buds biodegrading in this environment, however we have not been able to quantify this impact because we do not have associated carbon emission estimates. It is expected that these are unlikely to be large or cause any significant change to our net present value estimates given the very low weight of cotton buds stems and because this estimate applies only to 8.1% of cotton buds.

Monitoring and Enforcement Costs

There will be costs associated with inspection and law enforcement services to support the ban. The ban will be enforced through civil sanctions set out in Part 3 of the Regulatory Enforcement and Sanctions Act 2008.

A majority of respondents to the consultation proposed that local authorities, including Trading Standards, would be best placed to enforce the ban. We will work closely with Local Authorities to establish the most effective and efficient way of enforcement.

Local Authorities spending data shows that Local Authorities in England spent £113m on trading standards in 2017/18³⁵. We have allowed for around 2 days of one enforcement officer's time at 190 trading standards authorities per year, costed at £130/day³⁶, and applied this annually over the 10 year period. This gives an overall net present cost estimate of £0.3m. This approach is based on the analysis for banning plastic microbeads³⁷, where 2 days of staff time were allowed in year 1 for enforcement familiarisation. Due to the relatively high-profile nature of the plastic cotton buds ban and the larger number of businesses involved, we have extended this to an annual basis in order to provide a conservative estimate, allowing for familiarisation and active enforcement if required. This is also consistent with the estimate made by Resource Futures for Defra.

Costs to Businesses and Local Authorities:

Production costs

Some English businesses may lose business if they are unable to switch to alternatively made cotton buds, or may face costs investing in alternative products in order to continue business. It is not clear which costs, if any, will be encountered by businesses switching from plastic to paper cotton buds. However current evidence suggests that any costs are minimal since prices for both kinds of buds are similar, with a single bud being equivalent to 0.5 pence³⁸ for both plastic and paper cotton buds.

³³ Government conversion factors. Spreadsheet used [here](#), which underpins published [government gas reporting figures](#).

³⁴ Estimate based on figures by <https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables>. Local authority collected waste generation from April 2000 to March 2018 (England and regions) and local authority data April 2016 to March 2017

³⁵ <https://www.gov.uk/government/statistics/local-authority-revenue-expenditure-and-financing-england-2017-to-2018-individual-local-authority-data-outturn> (RO5)

³⁶ Based on ONS wage for local government staff at £12.48/hour + 30% on-costs

³⁷ https://www.legislation.gov.uk/ukia/2017/160/pdfs/ukia_20170160_en.pdf

³⁸ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

As the production of paper based buds will scale up following a ban in plastic stemmed cotton buds, producers of paper based buds may benefit from economies of scale, causing prices to decrease if lower production costs (per bud produced) are passed onto consumers.

This suggests that the impacts to businesses that are selling paper buds are low and possibly zero. This evidence is consistent with the European Commission, who modelled a zero impact to consumer costs up to 2030 for their impact assessment³⁹.

Furthermore the majority of buds consumed in England are produced outside of England. A global market research report lists the top 10 global manufacturers of cotton buds as having their main manufacturing base outside England (predominantly located in South-East and Southern Asia)⁴⁰. Also, there were no responses to the consultation from any England-based manufacturers. The costs that might be incurred by internationally based businesses is out of scope of this analysis.

As we have not been able to evidence any costs to English businesses involved in production we estimate there are zero production costs to business.

Business Implementation Cost

The price comparability of paper cotton buds to plastic cotton buds implies that businesses that provide cotton buds to consumers are unlikely to be hit by a change in materials.

Businesses that sell cotton buds that have not made commitments to switch material, may face costs that they would not have done under a ban. There may be a cost to those with surplus stocks of plastic cotton buds. Switching costs may include the staff administration and procurement cost of finding alternative suppliers of cotton buds. The ban has been delayed from October 2019 to October 2020, which should assist with this process. Switching costs may not exist at all for retailers if their suppliers agree to switch material.

The assumption of minimal cost to business was tested and supported at the consultation. Respondents did not provide evidence of any expected additional costs or constraints to industry.

We have estimated an additional £0.1m business implementation cost to retailers in year 1 of the ban, based on research for Defra by Resource Futures, in comparison to costs that would be incurred anyway in the counterfactual scenario. This cost is expected to cover familiarisation costs, and has been included in this post-consultation analysis in order to provide a conservative analysis on the impact to business.

Fuel Costs

There will be an increase in fuel costs for transporting cotton buds, as paper cotton buds weigh more than plastic stemmed cotton buds (0.44g compared to 0.25g per unit), so this will add to transportation costs (both the fuel cost to businesses and associated environmental costs of emissions) when the travel from production line to supermarket shelves is considered.

A number of important factors are unknown, which makes it difficult to form a reliable estimate of these costs:

- The average distance travelled by each cotton bud in England
- The number of buds carried on average in a truck
- The mode or modes of transport used to transport buds and the vehicles used
- The fuel cost of the additional weight per mile, which will depend on the mode of transport and the weight a vehicle is already transporting

We have estimated this cost using the information that is available:

- Paper-stemmed cotton buds are assumed to weigh 0.44g in comparison to 0.25g for plastic

³⁹ [European Commission](#) Impact Assessment – Reducing Marine Litter: action on single use plastics and fishing gear

⁴⁰ Global Cotton Bud Market Research Report 2018 By Players, Type and Applications, Status and Forecast, 2013-2025
<https://www.orianresearch.com/report/global-cotton-bud-market-research-report-2018/463369>

- Applying this weight difference to all cotton buds placed on the market (1.8bn) would mean that there would be an additional weight of 340 tonnes per year if all cotton buds were paper in comparison to plastic
- In comparison to the baseline scenario where some businesses are assumed to switch voluntarily, we estimate that the ban would result in an additional 340 tonnes to be transported over the 10 year appraisal period
- A Massachusetts Institute of Technology (MIT) study estimated that removing 10kg of weight from a truck can save 80L of fuel over 200,000km⁴¹
- This would imply that adding 10kg weight to a truck would require an additional 0.04L of fuel over 100km, costing 5p at fuel prices of £1.30/L diesel⁴². As the type of vehicle and weight already being transported are important variables here, this should be taken as an indicative estimate rather than a definite costing
- This would suggest that adding 340 tonnes⁴³ would require an additional 1,359L of fuel over a distance of 100km, costing £1,767.

Due to the uncertainty surrounding a number of the inputs to this estimate, we have included this figure as the low scenario estimate, and doubled it to provide a conservative central scenario estimate (£3,534). For the high scenario estimate, the estimated fuel costs have been tripled to reflect the uncertainty and to account for the extreme end of the scale (£5,301). These costs are then multiplied by the difference in the market share of plastic and non-plastic cotton buds in the baseline and policy scenario to determine the effect of the ban on fuel costs.

These numbers illustrate that any additional fuel costs from the ban are expected to be minimal, particularly considering that the impact would be experienced across a number of companies, with many likely to be transporting a small number of cotton-buds at a time within each truckload. The assumptions used for this calculation were tested with a representative of the British Retail Consortium⁴⁴ with regards to plastic straws (where the impacts are the largest), who agreed that additional costs to businesses are likely to be accounted for within the range provided.

In addition to the fuel costs to businesses (which have been included in the NPV and EANDCB calculations), the use of additional fuel would also incur additional greenhouse gas emissions. Using an average of 2.4 kg CO₂ equivalent per litre of diesel burned⁴⁵, we would expect an additional 3 tonnes CO₂e from the 1,359 litres of diesel required over the ten year appraisal period in the central scenario. Using Green Book non-traded carbon prices⁴⁶, this would be worth £77 when discounted over 10 years. Again, these costs are then multiplied by the difference in the market share of plastic and non-plastic cotton buds in the baseline and policy scenario to determine the effect of the ban on fuel costs.

Waste Management Costs

As stated in the fuel costs section, paper cotton buds weigh more than plastic buds (0.44g compared to 0.25g per unit). This will increase the waste management costs as landfill tax and landfill/incineration site gate fees are calculated by weight.

Local authorities and businesses are expected to share the additional waste management cost burden. We assume that the majority of cotton buds are disposed of in households, with some in commercial settings. This means that local authorities will bear most of the burden of the additional gate fee and

⁴¹ <http://www.nrcan.gc.ca/node/16755>

⁴² 1L diesel = £1.30, average annual estimate in 2018, <https://www.gov.uk/government/statistical-data-sets/oil-and-petroleum-products-monthly-statistics>

⁴³ 339,802 kilograms

⁴⁴ Stakeholder discussion with the British Retail Consortium, August 2019. 70% of the UK retail industry, by turnover, are members of the BRC: www.brc.org.uk.

⁴⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/696677/Data_tables_1-19_supporting_the_toolkit_and_the_guidance_2017__180403_.xlsx

⁴⁶ Green Book Supplementary [Guidance from BEIS](#), which recommends that non-traded sector carbon prices should be used for direct fuel use in non-aviation transport.

landfill tax. Only a small proportion of that cost will be to businesses. We expect businesses and local authorities to bear 10% and 90% respectively of the additional costs⁴⁷.

Monetisation and Assumptions

We have monetised the waste management costs using the following figures and assumptions:

- Paper cotton buds are assumed to weigh 0.44g in comparison with 0.25g for plastic buds
- 1.78bn cotton buds are consumed a year in England⁴⁸
- Our assumption is that 71% of cotton buds will be incinerated and 29% taken to landfill⁴⁹ ⁵⁰.
 - o Assuming all cotton buds are plastic, these percentages result in 118 tonnes going to landfill and 291 tonnes going to incineration respectively.
 - o Assuming all cotton buds are paper, they result in 208 tonnes going to landfill and 512 tonnes going to incineration respectively.
- Our central estimates are that the landfill gate fee is £23 per tonne, the incineration gate fee is £91.4 per tonne⁵¹ and the landfill tax is £94.15 per tonne⁵².
- This results in an estimated total additional waste management cost of £32,622 per year.
- We assume that 90% will fall to local authorities and 10% will fall to businesses. Resulting in an annual cost of £29,359 to local authorities and £3,262 to businesses over the appraisal period.

These costs are then put in 2017 prices, discounted, and multiplied by the profile to use which compares the ban and the no ban scenario to reflect the change in societal value caused by the policy. The resulting present value is £4,617 of additional waste management costs to local authorities and £513 of additional waste management costs to businesses over the 10 year appraisal period.

Costs to Consumers:

Evidence shows that the price of a single bud is currently equivalent to 0.5 pence⁵³ for both plastic and paper cotton buds. There is some uncertainty around the possibilities of an increase in price if demand for paper rises sharply around the time of the plastic ban, but there is also reason for the price of paper buds to fall as their production increases and economies of scale are achieved.

Disutility from using a different product

There may be concerns that cotton buds not made from plastic could be flimsier or harder to use with precision, creating a disutility cost to consumers.

However, evidence so far suggests that paper based alternatives to cotton buds are considered to be just as good to use, with Resource Futures having found from their research that ‘no evidence was identified that indicated the plastic-free alternatives were less effective than their plastic counterparts’. This suggests that any disutility experienced by consumers from the ban may be small or may not exist.

This was also supported by evidence from the consultation, where the majority of respondents did not think that there were any uses of cotton buds where a suitable alternative to a plastic stem did not exist. 5% thought that there were some uses where this was the case, with many of these respondents pointing to medical and/or forensic investigations. These uses account for a small quantity in our ban

⁴⁷ Defra's estimate based on the Resource Futures report

⁴⁸ [Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers](#)

⁴⁹ Estimate based on figures by <https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables>. Local authority collected waste generation from April 2000 to March 2018 (England and regions) and local authority data April 2016 to March 2017

⁵⁰ <https://www.wrap.org.uk/sites/files/wrap/Difficult%20to%20recycle%20products.pdf>

⁵¹ <https://www.letsrecycle.com/prices/efw-landfill-rdf-2/efw-landfill-rdf-2020-gate-fees/>

⁵² <https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2013>

⁵³ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

scenario. As such, the exemption of plastic-stemmed cotton buds for scientific uses within medical practice and forensic science provision were not modelled, but is recognised qualitatively.

Furthermore, consumers may gain a well-being benefit from using cotton buds that they believe are environmentally friendlier than plastic buds. The support for the ban demonstrated in the consultation (89%) suggests that for the majority of consumers, any benefit from using a plastic stemmed cotton bud is outweighed by the perceived benefits of using environmentally friendlier materials.

Benefits

The benefits of a ban on plastic stemmed cotton buds include: reducing the carbon emissions associated with the incineration of cotton buds; increased landfill tax revenue; improvements to marine environments; and well-being benefits to society from beach litter reduction. The benefits that stem from the reduction in marine and beach litter are reinforced by the ban on plastic straws and plastic stirrers which will also be implemented in October 2020. These products which are included in this package of single-use plastic bans are estimated to make up 5.7% of marine litter.

Summary of Monetised Benefits

Table 4 summarises the value of the benefits we have quantified. In our central estimate we expect £1.71m in total present value (TPV) terms of benefits to come from a ban of plastic stemmed cotton buds over a 10 year appraisal period.

Table 4	10 Year NPV estimates, £m:		
	Low	Central	High
Total Benefits:			
Disposal incineration emission benefit	£0.003	£0.004	£0.004
Landfill tax revenue*	£0.001	£0.001	£0.001
Reduced coastal clean-up costs	£0.036	£0.122	£0.178
Beach quality amenity benefit	£0.332	£1.590	£3.007
Total Benefits:	£0.373	£1.717	£3.191

*Note that the landfill tax revenue represents a transfer of money between relevant parties. It is an additional revenue to Government and a cost to businesses and local authorities. This means that we have used the same estimates for each scenario in our NPV calculations.

The largest benefits are associated with improvements to beach environments which saves clean-up costs and has well-being benefits. Evidence shows that plastic stemmed cotton buds are particularly present on beach environments⁵⁴, but clean beaches are highly valued by the public and they have a willingness to pay for cleaner beaches. A switch away from plastic stemmed cotton buds should see a significant reduction in cotton buds on beaches as plastic takes significantly longer to decompose than paper.

The other quantified benefits are from emission savings which come from paper based alternatives being cleaner to incinerate. Each tonne of paper burnt actually saves carbon dioxide equivalent (CO₂e) emissions through energy conversion. Each tonne less of CO₂e produced has an estimated benefit saving to the environment from abatement costs. In addition, paper cotton buds weigh more than plastic cotton buds, so they result in higher landfill tax revenue.

Summary of Non-monetised Benefits

A reduction in damage to marine life is a benefit which has not been monetised. Litter impacts marine life as materials can entangle or be ingested by wildlife. Harm to marine wildlife may be a strong public concern and a significant part of the rationale for a ban. Paper cotton buds are less harmful to marine

⁵⁴ [Seas at Risk](#): Single-Use Plastics and the Marine Environment

wildlife and quickly biodegrade⁵⁵, so a ban on plastic stemmed cotton buds will reduce the environmental costs of cotton buds.

The monetised and non-monetised benefits are presented side-by side in the following section, grouped under the category headings:

- Environmental emissions benefits
- Additional landfill tax revenue
- Reduced damage to marine life
- Reduced damage to fishing industry

Environmental Emissions Benefits

Production Savings:

Paper stemmed cotton buds are more environmentally friendly to produce than plastic stemmed cotton buds as for each tonne of paper produced, less carbon dioxide equivalent (CO₂e) tonnes are emitted than for each tonne of plastic. However, as the vast majority of cotton buds are produced outside England, mostly in Southeast Asia⁵⁶, the emissions saving from producing paper cotton buds will not directly benefit England. This environmental saving is not monetised in the NPV as they accrue abroad not domestically. Nevertheless it should be noted that moving towards paper stemmed buds should reduce the UKs overall consumption carbon footprint.

Incineration Savings:

Plastic emits more carbon dioxide equivalent (CO₂e) emissions when it is incinerated for energy recovery (819kg of CO₂e for each tonne of plastic polypropylene). This contrasts with paper which actually saves 331kg of CO₂e for each tonne incinerated as the energy is recaptured⁵⁷. While the process of incineration is the same for both materials, the respective emissions factors are very different. This is because the CO₂ released by burning paper is part of the natural carbon cycle and therefore the CO₂ released is not counted as additional. In comparison, carbon released from burning fossil-based plastic is considered as additional CO₂ in the atmosphere⁵⁸.

Given that each tonne of CO₂ has an environmental cost associated with it, this means that paper is significantly less damaging when given to incineration to dispose of.

Monetisation and Assumptions:

We have monetised this incineration benefit using the following figures and assumptions:

- 1.8 billion cotton buds are consumed in England each year⁵⁹. We assumed 1.6 billion for our low estimate and 2 billion for our high estimate.
- Paper cotton buds weigh 0.44g, compared to 0.25g per unit for plastic stemmed cotton buds⁶⁰, and the stem makes up 75% of the weight of a plastic cotton bud, and 86% of a paper one.
- For each tonne of material given to incineration, plastic polypropylene emits 0.8t of CO₂e, whereas paper production prevents the emission of 0.3t⁶¹.

⁵⁵ Wessex Water: it's time to switch the stick

⁵⁶ Resource Futures, based on Global Cotton Bud Market Research Report 2018

⁵⁷ See Annex 2 for carbon conversion factors used

⁵⁸ IPCC protocol for incineration and open burning of waste https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_5_Ch5_IOB.pdf

⁵⁹ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

⁶⁰ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

⁶¹ See Annex 2 for Government conversion factors, based on 2018 Carbon Factors

- We assume that the cost of one tonne of non-traded CO₂e in 2020 is £68.08, which increases up to £79.43 in 2030⁶².
- 91.9% of cotton buds are given to waste, or are littered and then collected by local authorities. This is an estimate based on 8.1% being disposed of down the toilet⁶³ and an assumption that zero cotton buds are recycled. The zero recycling assumption is based on the majority of cotton buds being disposed of in bathrooms where there is rarely any recycling. In addition, cotton buds that are put into recycling bins are likely to fall through sorting lines due to their small size. This assumption is also to give a conservative estimate, as if any cotton buds were recycled paper buds would emit less carbon equivalent emissions than plastic buds⁶⁴, leading to a higher NPV for the policy to ban plastic stemmed cotton buds.
- Of the 91.9% of cotton buds collected by local authorities, it is assumed that 71% are sent for incineration, with the rest sent to landfill⁶⁵
- These assumptions were used to generate monetised emissions projections for the scenarios, by calculating the emissions related to the differing proportions of plastic vs. paper stemmed buds
- The central baseline scenario (where the proportion of plastic buds on the market declines gradually from 80% market share to 1% by 2023) was compared to the ban scenario (with a ban in October 2020)
- Over the ten year appraisal period, there is a net benefit of £3,785⁶⁶

Additional Landfill Tax Revenue

As mentioned previously, paper cotton buds are more heavy than plastic cotton buds. This will result in an increase in government landfill tax revenue. The increase in revenue is calculated based on additional weight from the market switching to paper cotton buds.

The additional landfill tax revenue is also reflected in our calculation of the additional waste management costs to business and local authorities (as outlined in the costs section). This means that the net present value removes the landfill tax effect from the overall societal costs.

The additional landfill tax revenue has an estimated present value of £1,331 over the 10 year appraisal period. The cost section (on page 16) sets out our calculations and assumptions related to this impact.

Marine Benefits

Summary

Marine litter can entangle or be ingested by marine wildlife. Marine litter negatively affects societal wellbeing because it affects pristine seascapes and those who use marine environments. It also impacts those who do not use the marine environment themselves but value the fact that there exists a pleasant environment available to them and to others. There is a market failure as the ocean acts as a free open access resource with no direct private costs of disposal (with only a small chance of being caught and fined). The costs are experienced by all users and especially hits groups such as fishermen, water sports enthusiasts, beach goers and animal lovers. As a contributor to marine litter, banning plastic stemmed

⁶² Green Book Supplementary [Guidance from BEIS](#): guidance advises that non-traded carbon values should be used for emissions from household disposal.

⁶³ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

⁶⁴ Government conversion factors. Spreadsheet used [here](#), which underpins published [government gas reporting figures](#).

⁶⁵ Estimate based on figures by <https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables>. Local authority collected waste generation from April 2000 to March 2018 (England and regions) and local authority data April 2016 to March 2017

⁶⁶ Shown as £0.01m in Table 3 when rounded.

cotton buds will help to reduce these social costs. Coastal clean-up cost reduction and the amenity value of reduced litter have been monetised. Other benefits are assessed qualitatively.

Prevalence of Cotton Buds in Marine Environments

The estimates summarised below suggest that cotton buds make up around 1 – 5% of marine litter. For our central estimate we have taken figures from the 2016 Great British Beach Clean, where 23.7 cotton bud sticks were found per 100m, and cotton bud sticks made up an average of 3.7% of total item count on UK beaches⁶⁷. The European Environment agency estimated that cotton buds sticks make up 5.4% of marine beach litter in the Celtic Sea beaches⁶⁸, which we have used as our high estimate. On the low end, OSPAR⁶⁹ found that there were 4.9 cotton bud sticks per 100m of coast in the Southern North Sea (37 beaches in UK, France, Netherlands and Belgium), making up 1.1% of total number of items.

The ban on plastic stemmed cotton buds is expected to reduce the prevalence of marine litter, as the ban will help inform consumers of the damages they can cause, and fewer buds will reach marine environments as paper stems swell on contact with water and are much less likely to escape sewage filters. Furthermore, paper buds are less harmful to marine wildlife and quickly biodegrade⁷⁰. All of these effects will contribute towards an amenity benefit.

Coastal Clean-up Cost Reduction

Harbours and marinas have litter cleared in order to ensure that their facilities remain clean, safe and attractive for users. Mouat et al. (2010)⁷¹ estimated that UK municipalities spend approximately £15.8 million each year removing all forms of beach litter, and £2.1 million each year on harbours.

The ban will reduce marine litter clean-up costs on beaches and harbours as it will help inform consumers of the damages they can cause, and alternatively made cotton buds (which are expected to be paper-based) will decompose much more easily, so each bud will be present on beaches for less time and therefore there will be fewer of them. Plastics can take hundreds of years⁷² to decompose, whereas paper can take just a few weeks⁷³ to decompose.

Monetisation and Assumptions:

It has been possible to monetise the benefits of reduced clean-up costs following a plastic stemmed cotton bud ban, using a series of assumptions for our central estimate:

- The contribution of plastic stemmed cotton buds to litter on beaches is 3.7% (by item count) in our central estimate⁷⁴.
- Annual litter clean-up costs in 2010 were £15.8m for beaches and £2.1m for harbour sides. These figures are for the whole of the UK, so are likely to overestimate impacts for England (it was not possible to deduce how much of these costs are attributable to England only).
- We assume that if cotton buds were no longer present on beaches and harbour sides that there would be a litter clean-up cost saving equivalent to the portion of litter that cotton buds contribute. We take this approach based on the evidence collected by Mouat et al. (2010), who found that the majority of litter removal costs are variable costs.

⁶⁷ [Seas at Risk](#): Single-Use Plastics and the Marine Environment

⁶⁸ [European Commission](#) - Joint Research Centre Technical Reports, figures for Celtic Sea

⁶⁹ [OSPAR](#): Study to identify and assess relevant instruments and incentives to reduce the use of single-use and other items, which impact the marine environment as marine litter

⁷⁰ [Wessex Water](#): it's time to switch the stick

⁷¹ Mouat, Lozano, Bateson: Economic Impacts of Marine Litter, 2010. Figure based on exchange rate of £1 = EUR 1.14. For context, overall street cleaning cost local governments £778m in 2015/16 – The Litter Strategy for England, 2017.

⁷² [Wessex Water](#): it's time to switch the stick

⁷³ [US National Park Service](#)

⁷⁴ [Seas at Risk](#): Single-Use Plastics and the Marine Environment

- In our central estimate we assume that decomposition for paper stemmed buds takes 24 weeks, 0.2% of the time taken for plastic stemmed buds which take 300 years. The rate for paper is based on a low estimate of 6 weeks for newspaper to decompose⁷⁵. We have used a range of estimates for decomposition from 6 weeks to 60 weeks for paper and 200 – 400 years for plastic⁷⁶ to reflect the fact that rates vary according to oxygen, light and moisture levels.
- It is assumed that litter clean-up costs are linearly reduced by having fewer items on the beach to pick up and as paper stemmed buds take just 0.2% of the time taken by plastic stemmed buds to decompose it is assumed that there will be proportionally fewer buds remaining on the beach overall.
- These estimations were used to calculate the cost savings achieved in the ban scenario in comparison to the baseline (i.e. where switching away from plastic buds happens at a slower rate and they are not completely eliminated) – see page 8.
- The central net present benefit is £122,148 over the ten-year appraisal period for the ban, in comparison to the baseline.

Paper stems also swell on contact with water and are also much less likely to escape sewage systems if disposed of incorrectly, and therefore to reach the marine environment in the first place. Similarly, the EU is implementing comparable regulations that will mirror the benefits of this ban more widely.

It is assumed that because most litter clean-up costs are variable and beach cleaning is usually carried out manually in the UK⁷⁷, a reduction in the number of items will linearly reduce costs. In practice, the relationship between clean-up costs and the amount of litter on the beach will likely depend on a number of factors that will vary between locations, such as how frequent and thorough beach clean ups are. It is also possible that some fixed costs (such as hourly/daily contracts) could mean that cost reductions manifest in terms of workers having more time to spend picking up other items of litter on the beach, therefore increasing the overall efficiency of the clean-up rather than reducing the amount of cleaning time overall. The ban on plastic stemmed cotton buds should also be viewed in tandem with policies to ban plastic straws and plastic stirrers, therefore highlighting the cumulative impact of the bans as it is estimated that all three items contribute to around 5.7% of marine litter.

Amenity benefits of reduced litter on beaches

A ban on plastic stemmed cotton buds is expected to deliver amenity benefits to society by reducing litter. We have monetised the amenity impact of reduced litter in beach environments.

- 89% of people are concerned by plastic pollution in the ocean⁷⁸.
- Initially people may gain a satisfaction from knowing that something is being done to support marine environments (beaches and seas).
- Non-plastic stemmed cotton buds that end up in marine environments (8.1% of buds are disposed of down the toilet⁷⁹) will decompose faster and will not break down into micro-plastics, leading to fewer buds being found across all environments, and therefore the well-being costs associated with beach litter will be reduced.
- The presence of litter can contribute to a fear of crime and injury, both of which have a negative well-being impact
- Litter can discourage the use of public spaces and reduce our enjoyment of marine environments.

⁷⁵ Populus: Ocean Plastic Survey

⁷⁶ Taking an average based on estimates of 200 years from WWF, The Life Cycle of Plastics and 400 years from Wessex Water.

⁷⁷ Mouat, Lozano, Bateson: Economic Impacts of Marine Litter, 2010.

⁷⁸ Populus: Ocean Plastic Survey

⁷⁹ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

- There is a negative well-being impact experienced when harm to marine environments and the wildlife in them is observed (this was explored in the marine section).
- Clean environments have a value to people who care for the welfare of wildlife and other people, and littered environments affect people's sense of safety, enjoyment and willingness to use public spaces, and therefore there is a social disamenity cost associated with litter.

Monetisation and Assumptions:

Valuing the amenity value of reducing litter is a complex and under-researched area. In order to estimate the amenity value of reducing beach litter, stated willingness to pay to see "some" litter on the beach in comparison to "none" was used⁸⁰. This provides an estimate that respondents were willing to pay £6-£11 to see litter-free beaches (in 2002 prices). Although these figures are uncertain, they are relatively conservative in comparison with other estimates. They are also likely to be higher now than when the study was conducted in 2002 due to recent increased public awareness of the problems of marine litter.

We have estimated the benefit of reduced plastic cotton buds litter on beaches with the following assumptions and calculations:

- As above, based on beach litter count data, we estimate that the contribution of plastic stemmed cotton buds to litter on beaches is 3.7%⁸¹.
- The annual well-being loss caused by beach litter is £193m, based on a willing to pay between £6 and £11 per household
- There is no relevant empirical data on the precise nature and strength of the relationship between the amount of litter and the impact on individuals' or households' amenity value, so a linear relationship has been assumed. This assumption does not change the overall direction of NPV estimates, and the uncertainty that is here is well covered for within the scope of the scenario analysis
- As it is estimated that cotton buds make up 3.7% of beach litter, we assume that if they were all cleared, this would reduce the litter disamenity costs on beaches by 3.7%
- In our central estimate we assume that decomposition for paper buds takes 24 weeks, 0.2% of the time taken for plastic buds which take 300 years. As above, we have used a range of estimates for decomposition from 6 weeks to 60 weeks for paper and 200 – 400 years for plastic⁸² to reflect the fact that rates vary according to oxygen levels, light and moisture levels.
- As with the litter clean-up cost calculations above, the amount of items remaining on beaches is estimated to be directly proportional to the decomposition rate.
- These assumptions were used to calculate the disamenity associated with the proportion of plastic vs. paper cotton buds that reach beaches (in line with the proportions produced – see page 8) in each scenario
- In comparison to the baseline, the central ban scenario has a total present value of £1.59m over the ten-year appraisal period
- This provides the largest monetised benefit of introducing the ban

We have modelled this benefit because we believe that as paper decomposes so much quicker than plastic that this will reduce litter on beaches and therefore reduce clean-up costs and deliver amenity benefits. These savings may be overestimated as savings would be affected by factors such as how frequently and how thorough beach clean ups are. However, even if a higher number of paper stemmed

⁸⁰ Eunomia, using willingness to pay per household, P65. The estimate for the number of households in England is from ONS.

⁸¹ Seas at Risk: Single-Use Plastics and the Marine Environment. This estimate is based on the count of cotton buds collected in beach litter clean-ups, and has been used to provide an estimate of the visual impact of the litter. Data on the volume of litter that plastic cotton buds comprise was not readily available to estimate this impact. The European Commission IA on 'Reducing Marine Litter' (pg. 8/9) states that "beach litter item counts are internationally accepted as a reasonable indicator of the composition of marine litter", and that "[this] is the best indicator for the overall environmental, social and economic impacts".

⁸² Taking an average based on estimates of 200 years from 4ocean and 400 years from Wessex Water.

buds remain on beaches than is estimated here, the reduction of damaging marine plastic is likely to be a significant factor in the disamenity benefit achieved by the ban.

Furthermore, this benefit does not quantify the effect for cotton-buds that decompose in other marine settings, or that we expect less cotton buds will make it to the marine environment in the first place. This means that our figures likely underestimate the overall well-being benefit that would be achieved by a ban.

Plastic Entanglement Reduction

Entanglement in marine litter is thought to cause the death of 100,000 mammals each year in the North Pacific alone, a rate that appears to be increasing^{83,84}. Recording deaths is difficult as many casualties are likely to go unrecorded as they either sink to the ocean floor or are eaten by predators. Entanglement in nets, ropes and other debris poses a significant risk to marine animals and has been recorded in over 130 species of marine animals including 6 sea turtle species, 51 seabird species and 32 marine mammal species⁸⁵. Entanglement causes external cuts and wounds leading to infection, suffocation and drowning, asphyxiation, impaired mobility and fitness.

A ban on plastic stemmed cotton buds should help reduce entanglement as the ban will reduce plastic debris in the seas. This benefit is difficult to quantify due to the difficulties of placing a value on sea life, and we don't know how much plastic stemmed cotton buds currently contribute to entanglement. Alternatively made cotton buds may also contribute to marine litter and entanglement but we think this would be much reduced in comparison due to faster degradation rate.

Plastic Ingestion Reduction

All plastic items fragment overtime and it has been estimated that 50% of marine mammals, 40% of seabirds and all turtle species have been known to ingest plastic fragments⁸⁶. Plastic is known to be retained in animals' stomachs and can impede their dietary habits, either by making them feel full and therefore preventing them from eating, or by impeding their digestion. Both of these result in malnutrition and eventual starvation⁸⁷.

Plastic stemmed cotton buds are particularly risky for digestion due to their long thin form. This can cause physical damage to an animal's entire digestive system. If broken plastic cotton bud stems can be even more dangerous with ragged and sharp edges.

We would expect a reduction in plastic ingestion following a ban on plastic stemmed cotton buds. Although we have an estimate that 8.1% of all buds enter the marine environment⁸⁸, we have not been able to monetise the cost of marine life injured or lost to plastic ingestion, so therefore we have not been able to monetise the benefit of reduced plastic ingestion.

Damage to Fisheries

The European commission⁸⁹ estimated that the cost of marine litter to the fishing industry could be €60 million. We have not quantified the effect the ban would have on reducing these costs as it is not clear the extent to which cotton buds contribute to fishery damage, but even a small contribution by plastic stemmed cotton buds could cost thousands or millions of pounds each year, which could be prevented.

⁸³ Thompson, R.C., et al. Plastics, the environment and human health: current consensus and future trends. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 2009.

⁸⁴ Mouat, J., R.L. Lozano, and H. Bateson, *Economic Impacts of Marine Litter*, 2010.

⁸⁵ Kettunen, M., Bassi, S., and ten Brink, P., 2009, referenced in Mouat, J., R.L. Lozano, and H. Bateson: *Economic Impacts of Marine Litter*, 2010

⁸⁶ Estimates from Centre for Environment, Fisheries & Aquaculture Science

⁸⁷ [Cotton bud project](#)

⁸⁸ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

⁸⁹ http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm

Risks

Risks of imposing a ban

- **Increase in littering:** There is a risk that a change in material may encourage consumers to believe that the consequences of not disposing of cotton buds correctly will be reduced and that therefore consumers will litter more or not recycle cotton buds as frequently. However we expect that the ban will raise people's awareness of the environmental damage plastic cotton buds can cause, and that consumers will therefore dispose of them correctly and reduce their use of plastic cotton buds.
- **Increase in prices:** Even though our evidence suggests that paper based cotton buds are no more expensive to produce than plastic stemmed cotton buds, some suppliers may be forced to increase prices in the short term due to excess demand around the ban. There may also be an incentive to use the forced change in material following the ban as an opportunity to impose price rises on consumers.

Risks of not imposing a ban

- **Environmental costs get worse:** If we don't place a ban the environmental impacts including harm to marine wildlife may worsen, and possibly at a non-linear rate as annual flows contribute to an increasingly growing stock of plastics in oceans and rivers.
- **Commitments not met:** The ban forces retailers to adhere to the voluntary commitments many retailers have already made towards switching to paper-based cotton buds. If a ban is not imposed retailers may fall back on or delay commitments they have made.
- **Consumers keep choosing plastic:** Even though paper based cotton buds are increasingly being made available to consumers, and there is strong consumer support for paper based buds⁹⁰ there is a risk that consumers will still opt for plastic stemmed cotton buds without a ban. They could do so inadvertently if products are not well labelled, or consumers may find that they prefer plastic buds. It may be that there is a time inconsistency problem where consumers state that they should not use plastic stemmed cotton buds because of their associated environmental harms, but upon purchase they discount future and indirect environmental costs too strongly in favour of a plastic product that they may prefer to use now. Since consumers have only recently been given a choice between paper and plastic stemmed cotton buds by large retailers we do not have evidence to describe current consumer behaviours.

Monitoring

We are required under section 67 of the Regulatory Enforcement and Sanctions Act 2008 to publish a review every 3 years after entry into force of these regulations, of the operation of the provisions in these regulations and the Schedule in the regulations. The review will consider whether the provision has implemented its objectives efficiently and effectively.

We will also publish a review of the regulatory provision contained in these Regulations before five years after entry into force of these regulations has passed, and publish subsequent reports at intervals not exceeding five years. This review will set out the objectives intended to be achieved by the regulatory provision; assess the extent to which those objectives are achieved; assess whether those objectives remain appropriate; and if those objectives remain appropriate, assess the extent to which they could be achieved in another way which involves less onerous regulatory provision.

Defra will review the policy and the current exemptions after the ban has been in place for a year, to assess its effectiveness in cutting the number of plastic cotton buds used, its impact on the forensic and medical sectors, and whether the policy needs to be revised.

⁹⁰ [YouGov](#) finds overwhelming support for banning 'problem plastics'.

Equality Impact Assessment

The public sector equality act introduced the requirement for public bodies to assess whether policy proposals will unlawfully discriminate against a group of people. We consulted on our proposals to restrict the supply of plastic cotton buds on the 22 October 2018 to the 03 December 2018 and have continued to engage with stakeholders throughout the development of these regulations. The consultation asked a number of questions regarding the impact that restrictions may have, and whether there were suitable alternatives on the market and provided a space for responders to highlight any particular concerns which they may have had. No respondents supplied any opinions or evidence that the ban could disproportionately affect any groups of people. We are confident that the restrictions to the supply of plastic cotton buds will not disproportionately affect any segment of society.

SAMBA - Small and Micro sized Business Assessment

Any cost to small and micro sized businesses involved in the production of plastic stemmed cotton buds is likely to be small as the majority of buds consumed in England are produced outside of England. A global market research report lists the top 10 global manufacturers of cotton buds as having their main manufacturing base outside England (predominantly located in South-East and Southern Asia)⁹¹. No consultation responses were received from any England-based manufacturers reporting additional costs.

Resource Futures estimated that the overall cost to retailers from implementing the ban, in comparison to costs that they would have incurred anyway under the “no ban” scenario, are negligible. The cotton buds retail market is overwhelmingly dominated by own-brand products from the main retailers: Tesco, Sainsbury, Asda and WM Morrison, with Johnson and Johnson the leading non-supermarket brand (<5% by value)⁹². Health and beauty retailers such as Boots and Superdrug also have significant market share. This is opposite to small and micro sized businesses that currently have a very small share in the retail market for cotton buds. The impact to these businesses in retail is expected to be very small and they are not expected to be impacted disproportionately. This is because small and micro retailers are likely to purchase buds from wholesalers, in this way acting more like consumers. As the prices of plastic and paper stemmed buds are estimated to be comparable, these retailers are not expected to face any additional costs here.

There may be a cost to small and micro businesses with surplus stocks of plastic stemmed cotton buds, however, as the implementation date of the ban has been moved from October 2019 (and subsequently from April 2020) to October 2020, this should reduce any switching costs and allow retailers more time to prepare.

Additional fuel costs caused by paper cotton buds being heavier than plastic stemmed cotton buds will fall to businesses involved in transportation services, a portion of which may be small sized businesses. The additional fuel costs are likely to be insubstantial given that current prices for paper cotton are comparable to plastic cotton buds despite being heavier.

Similarly, we do not expect additional waste management costs to affect small sized businesses disproportionately. The total estimated cost to businesses is very small (i.e. £513 over the 10 year appraisal period) and would be shared across numerous businesses.

Carbon Impact

Banning plastic stemmed cotton buds will reduce carbon emissions. Table 5 provides an estimate of the net CO₂ equivalent change in greenhouse gas emissions over the next 10 years as a result of the preferred option, globally and to England, and whether the emissions count as traded or non-traded emissions.

⁹¹ Global Cotton Bud Market Research Report 2018

By Players, Type and Applications, Status and Forecast, 2013-2025 <https://www.orianresearch.com/report/global-cotton-bud-market-research-report-2018/463369>

⁹² Euromonitor (2017) COUNTRY REPORT - COTTON WOOL/BUDS/PADS IN UNITED KINGDOM Example data
<http://www.euromonitor.com/cotton-wool-buds-pads-in-the-united-kingdom/report>

Table 5 - Carbon emission savings over 10 years (CO2e tonnes)	Global Emissions		Emissions in England	Traded	Non-traded
Production emission savings	69.83		-	Y	
Incineration emissions savings	58.38		58.38		Y
Landfill emission savings	-	33.20	-	33.20	Y
Fuel emission savings	-	1.18	-	1.18	
Total saving:	93.82		24.00	69.83	25.18

Emissions from production count as traded emissions (covered under the European Emissions Trading Scheme), whereas emissions released in disposal (incineration and landfill) count as non-traded emissions⁹³.

Savings from production emissions are counted as zero in England, and are included for illustrative purposes only, as we have assumed that cotton buds are all imported. Globally, paper cotton buds will add emissions compared to plastic through being heavier and through emitting more emissions when placed in landfill. However there is a net saving due to paper being significantly cleaner to produce than plastic, and through having an emission reduction impact through energy conversion when it is incinerated.

⁹³ For guidance on this, see Green Book Supplementary [Guidance from BEIS](#).

Annex 1

Annex 1 shows the scenario analysis described in the counterfactual section. The table shows the percentage of the market share forecast to still be plastic over the next 10 years. The counterfactual described in the 'no ban central' scenario has been used to calculate the net present values in Table A1.

Table A1 Year	Ban			No Ban		
	Low	Central	High	Low	Central	High
2018	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
2019	75.0%	55.0%	35.0%	75.0%	55.0%	35.0%
2020	41.7%	25.0%	8.3%	50.0%	30.0%	10.0%
2021	0.0%	0.0%	0.0%	25.0%	5.0%	2.5%
2022	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%
2023	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%
2024	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%
2025	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%
2026	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%
2027	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%
2028	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%
2029	0.0%	0.0%	0.0%	5.0%	1.0%	0.5%

*With the ban coming into force in October 2020, there will still be a proportion of plastic cotton buds used until this point.

Annex 2

Table A2: UK only GHG emissions for polypropylene and paper, in kg CO₂e per tonne of material⁹⁴

Waste Streams	Production Emissions⁹⁵ (kg CO ₂ eq per tonne material)	Energy Recovery (combustion) (kg CO ₂ eq per tonne material)	Landfill (kg CO ₂ eq per tonne material)
Plastics: PP	1,876	819	9
Paper	354	-331	1,042

*This analysis assumes all cotton buds are imported, therefore the production emissions savings from producing plastic instead of paper is 0, as GHG savings don't accrue to the UK.

⁹⁴ WRAP data

⁹⁵ This impact assessment assumes all cotton buds are imported, therefore the production emissions savings from producing plastic instead of paper is 0, as GHG savings don't accrue to the UK.