



CLEANING UP OUR ACT

# Reducing the impacts of problematic plastics

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Better regulation statement

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## Executive summary

In June 2021, the NSW Government released the *NSW Plastics Action Plan*. The purpose of the plan is to outline actions to reduce plastic waste and to improve management of plastics. The overarching objective is reducing the impact of plastics on the environment and human health.

Under the plan, the NSW Government commits to banning a number of problematic plastics in NSW. Problematic plastics include:

- single use items such as plastic bags, cutlery and straws
- plastic items that contribute to the litter stream or have limited recycling or re-use opportunities
- items that lead to contamination of recycling streams through existing recycling systems.

The regulatory framework underpinning the bans will allow NSW to phase out specific items and set mandatory design standards to prohibit the use of specific material types or additives or require consumer labelling to improve appropriate disposal of the product.

Using this regulatory framework, the NSW Government will ban certain problematic plastic items including:

- lightweight plastic bags
- single-use plastic cutlery, stirrers, straws, plates, bowls and cotton buds
- expanded polystyrene (EPS) food service items.

It will also set a design standard to prohibit the use of microbeads in rinse-off personal care products.

## A range of considered options

Three options have been considered for government action to address the adverse impacts of problematic or unnecessary plastics, including single-use plastics (Table ES 1). A cost-benefit analysis has been undertaken of Options 1, 1b, 2 and 3, with the costs and benefits of each option assessed relative to a base case.

**Table ES 1. Options for government action**

Option	Description
Base case	Continuation of the status quo
Option 1 and 1b <sup>1</sup>	Phase out supply and use of problematic and unnecessary plastics and set design standards to prohibit the use of oxo-degradable plastics and microbeads in rinse-off personal care products, combined with public education
Option 2	Improve waste disposal/litter infrastructure in public places, combined with community education
Option 3	Voluntary program in designated regions and towns to not supply and use single-use plastic items

The central results of the cost-benefit analysis are based on a 7% discount rate and 20-year analysis period (Table ES 2).

<sup>1</sup> A variant of Option 1, Option 1b involves legislated phase out of a smaller range of plastic items was also assessed as a sensitivity (single-use plastic cups and bowls with lids will not be phased out, heavyweight plastic bags will be subject to a voluntary industry phase out and a design standard will not be set to prohibit oxo-degradable plastics).

**Table ES 2. Summary of results, Options 1, 1b, 2 and 3 (20-year analysis period)**

Key measure	Option 1	Option 1b	Option 2	Option 3
Incremental benefits (\$ million)	\$1,780.8	\$708.7	\$83.0	\$248.0
Incremental costs (\$ million)	\$1,418.6	\$623.7	\$68.3	\$267.7
Avoided litter (million items)	5,482	2,697	998	572
Avoided litter (tonnes)	21,420	5,732	3,660	1,974
Net benefits (\$ million)	\$362.3	\$85.0m	\$14.7	-\$19.7
Benefit cost ratio (BCR)	1.26	1.14	1.22	0.93

Option 1 has a net benefit of \$362 million and a benefit-cost ratio (BCR) of 1.26, meaning that its implementation is likely to lead to a net benefit to the NSW community.

Option 2 has a net benefit of \$15 million and a BCR of 1.22. The relatively small net benefit of this option reflects the limited benefits in terms of reduced litter, but correspondingly low costs.

Option 3 has a net cost of -\$20 million and a BCR of 0.93 over a 20-year analysis timeframe. This result suggests that implementation is unlikely to lead to a net benefit to the NSW community.

Sensitivity analysis of changes to key variables was undertaken. Under all sensitivity tests, Option 1 maintains a positive net present value (NPV) and BCR greater than 1. Similarly, Option 2 maintains a BCR of greater than 1 under most scenarios. Option 3 maintains a BCR of less than 1 under most scenarios.

Option 1b – a variant of Option 1 – was also assessed for sensitivity purposes (Table ES 2). Under Option 1b, single-use plastic cups and bowls with spill-proof lids are not phased out, heavyweight plastic bags are subject to a voluntary, industry-led phase out, and a design standard will not be set to prohibit oxo-degradable plastics. All other plastic items listed for Option 1 will still be phased out. Over a 20-year analysis period, Option 1b has a net benefit of \$85.0 million and a BCR of 1.14, meaning that its implementation is likely to lead to a net benefit to the NSW community.

It is important to note that the results do not include costs and benefits of phasing-out plastic microbeads and other non-soluble plastic polymers used in personal care products. We note that this exclusion is unlikely to significantly affect the results.

## Distributional impacts

For Options 1, 1b and 3, most of the costs (single-use alternatives) and avoided costs (avoided single-use plastics and avoided consumption) accrue to retailers and consumers. This impact is driven by the unit costs of the plastic items no longer supplied and the unit cost of the replacement items. Whether the costs ultimately fall on retailers or on consumers will depend on the extent to which costs and avoided costs are passed on from retailers to consumers. Compliance costs for Option 1 (and 1b) accrue to the state government. For Option 3, costs associated with implementing and co-ordinating the program are assumed to fall to the state government.

For Option 2, all the benefits accrue to the community as a result of avoided litter impacts, while all the costs accrue to government (either state government or local councils) in the form of capital and servicing costs of public bins and litter traps.

## Preferred option

Option 1b is the preferred option to reduce the impacts of problematic plastic items. This option will ban the supply of prohibited plastic items or plastic products that do not conform to a prescribed design standard (such as rinse off personal care products containing plastic microbeads). Both banning specific items and mandatory design standards will operate in a complementary manner, with the same compliance regime and penalties.

The plastic items proposed to be banned include:

- lightweight shopping bags (35 microns or less)
- single-use plastic straws, cutlery and stirrers
- single-use plastic plates and bowls (excluding bowls with spill proof lids)
- single-use plastic cotton buds
- expanded polystyrene (EPS) food and beverage containers

Despite the high BCR achieved from phasing out heavyweight plastic shopping bags (greater than 35 microns)<sup>2</sup>, these items will not be phased out in the first tranche. The National Retail Association has indicated they will roll out a national voluntary phase out of heavyweight plastic bags by 2023. The NSW Government will monitor industry progress against this target and will make the phase out of heavyweight plastic bags mandatory in a second tranche of phase outs if the target is not achieved. Option 1b includes assessment of the comparative benefits and costs of this voluntary approach, as opposed to the regulatory approach assessed under Option 1.

While the cost-benefit analysis shows strong support for banning plastic cups and bowls with lids, a lack of affordable, accessible and functional alternatives means that these items will not be phased out at this time.

The NSW Government will also introduce a design standard to prohibit the supply of rinse off personal care products containing plastic microbeads.

The preferred option also includes the power to prescribe design standards that could:

- address how a product or packaging made from or containing plastic is designed
- specify what materials or additives it must or must not be composed of or combined with
- require clear labelling on plastic products or packaging to inform the consumer how to safely and effectively dispose or recycle the packaging.

The preferred option realises a net benefit across the range of impacted items. While some items, such as EPS food service items and straws come at a net cost over 20 years, banning these items as part of the broader package acts to offset these costs and deliver a net benefit to NSW. Failure to act on these items means the government would not achieve its public commitment and primary objective of mitigating the environmental impact of single-use plastics nor its ambitious litter reduction targets.

During public consultation and in ongoing correspondence, the preferred option showed exceptionally strong community support. Further, failure to act on highly littered plastics means NSW falls further behind other jurisdictions, both in Australia and internationally.

It is advantageous to announce and pursue the problematic plastic bans and the design standard to prohibit plastic microbeads in rinse-off personal care products as a single package of interventions, with staggered implementation to allow sufficient transition time for different products types. The reforms will be accompanied by consumer and business education campaigns to ensure awareness and improve effectiveness of the intervention. As multiple items are phased out simultaneously, many of the costs are shared between items. This reduces the relative cost burden on each item being regulated. This approach maximises efficiency in operating costs and minimises business and community uncertainty and disruption.

## Consultation

Development and assessment of options to reduce the impacts of problematic plastics has been supported by three levels of consultation:

<sup>2</sup> Heavyweight plastic shopping bags include the 'reusable' plastic bags available at supermarkets for a small fee or the 'single-use' heavyweight bags provided by department stores or boutique retailers. It does not include 'green' non-woven reusable bags.

- Community feedback on the discussion paper released in March 2020.
- A survey on community attitudes to single-use plastics in mid-2020 during COVID-19.
- Targeted consultations with key stakeholder organisations.

Appendix 1 lists all stakeholders who provided a written submission.

Some key themes emerged from these consultations:

- Strong support for the phase out of single-use plastics and taking action to address plastic from key industry and environmental stakeholder organisations, as well as from the broader community (98% supported phase outs and 98% supported setting design standards to prohibit the use of oxo-degradable plastics).
- 86% of survey respondents supported setting design standards for plastic items more generally.
- a phase-out period that would not adversely affect existing contracts or disrupt supply chains and recognised the complex global supply chain for both manufacturing and waste.
- Some plastic products, including plastic straws, need to be available for people with a disability or other medical need.
- Industry is concerned about the lack of affordable alternatives to heavyweight bags but they are working towards voluntary reductions in use of these products, supported by the National Retailers Association.
- The cost of single-use alternatives to plastics, while significantly higher than single-use plastics, can be expected to fall over time with the wholesale adoption of the alternatives.
- The process for identifying and setting future design standards should be communicated and acknowledge existing work where relevant.
- Future design standards should consider the need to comply with other standards such as medical- and food-related standards, which could warrant possible exemptions.
- A key barrier to widespread adoption of litter bins and litter traps is the cost of servicing and maintaining the infrastructure.

## Action is proportional and effective

The impacts of plastic litter and microplastics on the NSW environment, and especially marine ecosystems, combined with the market failures that contribute to those impacts, all point to the need for government intervention. Given the scale of the problem and the economic net benefit achieved by the proposed regulation, the preferred option – to prohibit the supply of certain plastic items – is proportional and effective. This is supported by the actions of other Australian and international jurisdictions, which have introduced similar interventions to manage the problems associated with problematic plastics. The initiative also has resounding public and stakeholder support.

## Evaluation and review

The department will review the legislation 5 years after it has come into effect.

The department will monitor the contribution of the bans and design standards towards achieving the targets of the *NSW Waste and Sustainable Materials Strategy 2041*, including the state outcome indicator 'Percentage reduction in the consumption of problem single-use plastics'.

If additional items are prohibited, or a new design standard is imposed, a rigorous and robust process will be undertaken. This may include evidence of environmental or economic harm, extensive stakeholder consultation or cost benefit analysis. Any new regulations will, at a minimum, meet the obligations outlined in the *NSW Subordinate Legislation Act 1989*.

# Introduction

## Purpose of this document

This document is a better regulation statement (BRS) prepared in accordance with the NSW Government *Guide to Better Regulation* (NSW Treasury 2019). The focus of the BRS is the new regulatory interventions to reduce the negative impacts of plastic on our environment and the NSW economy. The proposed legislation seeks to prohibit in a phased way the supply of various problematic or unnecessary plastic items and items that do not meet a prescribed design standard.

As detailed in the *Guide to Better Regulation*, all new and amending regulatory proposals must demonstrate the application of the 'better regulation' principles to ensure regulation is appropriate, effective, and efficient. The better regulation principles are as follows:

- **Principle 1** – The need for government action should be established. Government action should only occur where it is in the public interest and where the benefits outweigh the costs.
- **Principle 2** – The objective of government action should be clear.
- **Principle 3** – The impact of government action should be properly understood by considering the costs and benefits (using all available data) of a range of options, including non-regulatory options.
- **Principle 4** – Government action should be effective and proportional.
- **Principle 5** – Consultation with business and the community should inform regulatory development.
- **Principle 6** – The simplification, repeal, reform, modernisation, or consolidation of existing regulation should be considered.
- **Principle 7** – Regulation should be periodically reviewed and if necessary reformed to ensure its continued efficiency and effectiveness.

All significant new and amending regulatory proposals require a BRS to demonstrate they meet the better regulation principles. In general, a regulatory proposal is considered significant if it could do at least one of the following:

- introduce a major new regulatory initiative
- have a significant impact on individuals, the community, or a sector of the community
- have a significant impact on business, including by imposing significant compliance costs
- impose a material restriction on competition
- impose a significant administrative cost to government.

The proposed regulatory interventions resulting from the *NSW Plastics Action Plan* meets this criteria.

## Objectives of government action

The NSW Government recently released the *NSW Plastics Action Plan*, a comprehensive roadmap to how NSW will reduce the negative impacts of plastic on the environment, human health and the NSW economy. The plan outlines key actions that seek to reduce plastic waste and improve the management of plastic within a circular economy by driving improvements in product design, recovery, re-use and innovation.

The NSW Government emphasises that these objectives should be achieved in a way that minimises impacts on consumers and maximises the economic opportunities of management approaches.

The plan sits alongside the *NSW Waste and Sustainable Materials Strategy 2041*, also recently released by the NSW Government.

In March 2020, the then NSW Department of Planning, Industry and Environment released the discussion paper *Cleaning up our Act: Redirecting the Future of Plastic in NSW* for public consultation. It canvassed proposed actions for inclusion in the plan. The discussion paper sought community feedback on 10 priority directions outlined under 4 key outcomes areas.

### **Outcome 1: Reduce plastic waste generation**

Proposed target – Phase out key single-use plastics

- Priority Direction 1: Harness people power to create a fundamental shift in the way we use plastic
- Priority Direction 2: Set design standards for plastic consumer items
- Priority Direction 3: Phase out key single-use plastic items

### **Outcome 2: Make the most of our plastic resources**

Proposed target – Triple the proportion of plastic recycled in NSW across all sectors and streams by 2030

- Priority Direction 4: Make producers of plastic items more responsible for collecting and recycling in NSW
- Priority Direction 5: Mandate 30% minimum recycled content in plastic packaging in NSW by 2025
- Priority Direction 6: Support demand and industry capacity

### **Outcome 3: Reduce plastic waste leakage**

Proposed target – Reduce plastic litter items by 25% by 2025

- Priority Direction 7: Use extended producer responsibility schemes to fund litter collection and end-of-life plastic management
- Priority Direction 8: Invest in infrastructure that can better manage plastic before it causes harm

### **Outcome 4: Improve our understanding of the future of plastics**

Proposed target: Make NSW a leader in national and international research on plastics

- Priority Direction 9: Set up a NSW plastics research network by 2021
- Priority Direction 10: Support commercialisation of research-driven plastics solutions

Over 16,000 submissions were received in response to the discussion paper. The submissions indicate strong community support for initiatives proposed in the plan including initiatives aimed at reducing the impacts of single-use and problematic plastics and plastic litter more broadly.

A survey of over 300 community members conducted on behalf of the department in May 2020 also found significant net positive community support for a phase out of single-use plastics, even after allowing for the extra costs of alternatives (IPSOS, 2020).

## **Objectives of policy options**

Consistent with the first outcome area under the plan, the NSW Government has considered a range of policy options to reduce the negative impacts of problematic plastics in NSW.

The department developed detailed options that focussed on single-use and problematic plastic items, as well as the design of products containing oxo-degradable plastics and microbeads. These items are especially prevalent in the litter stream, ending up in marine environments and causing significant environmental damage. Urgent action is needed to manage these items and mitigate the immediate and profound impact they are having on the environment. Comprehensive cost-benefit analysis was undertaken to consider the impact of each proposed option.

## Need for government action

Plastics are lightweight, low cost and strong, making them ideally suited to a broad range of applications, including clothing, packaging, telecommunications and transport.

However, increasing concerns are being raised about the adverse impacts of plastic litter, especially on marine ecosystems. In response, national and international research and policy organisations have devoted substantial effort to identifying and quantifying the impacts of plastic litter on marine environments.

Recent research by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the United Nations Environment Programme (UNEP), the National Oceanic and Atmospheric Administration of the US Department of Commerce, and other research institutes confirms that plastic litter has now become a serious pollution problem. Plastic litter has reached all the oceans of the world in substantial quantities, resulting in adverse effects on marine organisms and ecosystems. Plastic litter is also having significant economic and social impacts. Moreover, evidence indicates that it is very difficult and costly to clean up litter once it has entered marine environments.

The design and intended purposes of plastic products can contribute to the potential for a plastic item to be littered. Many national governments have now enacted laws that place some type of ban on single-use plastics, either on the supply and use of specific products (such as plastic bags, plates, cups, straws and packaging), on the supply and use of specific materials (for example polystyrene and oxo-degradable plastics) or on their use in certain production processes.

In Australia, most state and territory jurisdictions have either enacted policies or are actively considering policy options to address the supply and use of single-use plastics and oxo-degradable plastics. Voluntary initiatives have also been undertaken to reduce the supply and use of single-use plastics, notably a decision in 2018 by major retail supermarkets in Australia to cease supplying lightweight, single-use plastic bags in their stores. Furthermore, the National Waste Policy Action Plan includes a target to phase out problematic and unnecessary plastics by 2025.

In addition to the impacts of plastic in the environment, irresponsible plastic use contributes to the unsustainable depletion of resources and causes issues with waste management. In NSW, as well as in other Australian jurisdictions, when a plastic product is sold on the local market, there is often no obligation on the producer to take responsibility for what happens to that item when it reaches the end of its useful life. This means that responsibility for the disposal of plastic waste typically falls to consumers and local governments, with producers treating the environmental and waste management costs of their products as an externality to be borne by wider society.

## Impacts of plastics

### Plastics consumption

The annual global production of plastic has increased greatly since the development of synthetic polymers in the 1950s. In 2018, global production of plastics was almost 360 million tonnes, well over double the production levels of 20 years ago (PlasticsEurope 2019).

In 2019–20, an estimated 1.13 million tonnes of plastics were consumed in NSW. Approximately 2.2% of this total (25,009 tonnes) was single-use plastics and oxo-degradable plastics, which fall within the scope of the *NSW Plastics Action Plan*. Oxo-degradable plastic is used in a variety of common consumer and single-use products such as plastic bags, blister packs, clamshells, pallet and shrink wrap, trays and agricultural films. Table 1 shows NSW consumption of in-scope plastic items in 2019–20.

**Table 1. Consumption of in-scope plastic items in NSW, 2019–20<sup>3</sup>**

Problematic plastics	Consumption (tonnes)	Consumption (millions of items)	Item type composition (%/tonne consumed)
Lightweight plastic shopping bags	3,928.9	726.7	15.7%
'Reusable' heavyweight plastic shopping bags	4,783.9	164.9	19.1%
Disposable plastic plates, bowls, cutlery, etc.	12,305.9	1,578.7	49.2%
Expanded polystyrene food and beverage containers	427.5	93.6	1.7%
Plastic straws	682.0	977.1	2.7%
'Single-use' heavyweight boutique plastic bags	488.6	16.3	2.0%
Oxo-degradable plastics	2,341.1	24.4	9.4%
Single-use plastic cotton buds	50.9	508.9	0.2%
<b>Total in-scope problematic plastics</b>	<b>25,009.0</b>	<b>4,090.8</b>	<b>100.0%</b>

The size of plastic microbeads and the nature of their use means it is not feasible to accurately quantify the amount currently used in personal care products. Nor is it feasible to quantify plastic microbeads that are entering land and marine environments following their use.

Plastic items come in a range of plastic polymer types. Table 2 provides an overview of the most used plastics and their main applications.

**Table 2. Common plastic types and their applications**

Code	Name	Applications
 PET	Polyethylene terephthalate	Beverage containers, food jars, microwavable food trays, textiles (polyester), monofilament, carpet, films
 HDPE	High-density polyethylene	Bottles (beverage, detergent, shampoo), lightweight single-use bags, cereal box liners, extruded pipe, wire, and cable coverings
 PVC	Polyvinyl chloride	Packaging (clamshells, food wrap), pipes, siding, window frames, fencing, flooring, and medical products (blood bags, tubing)
 LDPE	Low density polyethylene	Bags (produce, heavier boutique, dry cleaning, newspaper, and garbage bags), squeeze bottles, container lids, shrink wrap, toys, coatings for beverage cups, wire, and cable coverings
 PP	Polypropylene	Takeaway food containers, plastic cutlery, straws, food and other storage containers, medicine bottles, bottle caps, fibres, appliances, carpeting
 PS	Extruded and expanded polystyrene	Plastic cutlery, cups, plates, bowls, cutlery, hinged takeaway food containers (clamshells), electronic housings, building insulation, coat hangers, medical products, packaging foam, foamed coolers
 OTHER	Other – could be made from a combination of resins 1–6 or resins different to 1–6	Reusable water bottles, glasses (lenses), some citrus juice and sauce bottles, oven-baking bags, custom packaging.

<sup>3</sup> Sources: Envisage Works 2020, Marsden Jacob, 2020

## Effect of the design of plastic items on the environment and recycling

The design of plastic products can lead to a greater potential for the item to be littered and/or cause damage the environment. For example, design features such as removable lids on beverage containers can increase their littering rate. Likewise, the use of oxo-degradable plastics or plastic microbeads can increase the quantity of microplastics found in the environment.

In addition to increased litter potential, poor design can increase contamination of the kerbside recycling stream with products that cannot, in practice, be recycled using current readily available technology. Alternatively, poorly designed or labelled products may be sent to landfill when they could be recycled in the kerbside system.

These failures are due to both consumer confusion about appropriate disposal methods and the types of materials from which consumer products are constructed. The low quality of contaminated recycling streams reduces the opportunities for these materials to be reused in higher order products, such as new packaging. This causes kerbside recycling to become a low-value product with limited viable end markets.

Difficult-to-recycle plastics such as polyvinyl chloride (PVC) and polystyrene are common contaminants of the recycling stream and are often used in labels and lids. The comparatively low volumes of problematic plastics that end up in kerbside recycling mean that investment in infrastructure to sort them from other materials is not commercially viable, and the presence of these materials reduces the value of other material types, such as polyethylene terephthalate (PET), polyethylene (both high density and low density) or glass. This reduces the commercial viability of what are otherwise easily recycled and highly valued commodities.

## Plastic litter entering marine environments

International data indicates that plastic waste and litter is increasing rapidly, and that plastic litter is already the most abundant type of litter in oceans globally. There are major concentration patches of floating plastics in all the 5 big ocean gyres, and there is evidence that even the polar areas are acting as additional global sinks of floating plastics (Cozara et al. 2014).

A comprehensive international study of the quantity of plastic litter coming from land into oceans estimates that 275 million tonnes of plastic waste was generated in 2010, of which 4.6 to 12.7 million tonnes (1.7% to 4.6%) ended up in oceans (Jambeck et al. 2015). A more recent study has refined estimates of plastic pollution entering the ocean from land to 11 million metric tons in 2016, adding to the estimated 150 million metric tons of plastic already in the ocean. Plastic flows into the ocean are projected to nearly triple by 2040 to 29 million metric tons per year unless concerted action is taken to address plastic pollution (Lau et al., 2020; Pew Charitable Trusts & SystemIQ 2020).

Litter clean-up data supports the prevalence of plastics in marine litter. Data from the International Coastal Clean-up program in 2018 found that, globally, 9 of the 10 most frequently collected types of litter<sup>4</sup> were plastic, with the other major litter type (cigarette butts) also containing plastic (Ocean Conservancy 2018).

Moreover, the quantity of plastic litter observed floating in the open ocean (one-sixth) or collected from beaches (one-sixth) represents only one-third of the total input of plastic litter in marine environments. The remaining two-thirds of total input to marine environments ends up on the seabed. Therefore, quantifying only floating plastic debris significantly underestimates the amounts of plastics in marine environments (Gallo et al. 2018).

Comprehensive Australian data on marine plastic litter and plastic litter more generally has only recently started to be compiled. However, initial data is consistent with international data in terms of the prevalence of plastics in marine litter. The NSW Container Deposit Scheme Monitoring

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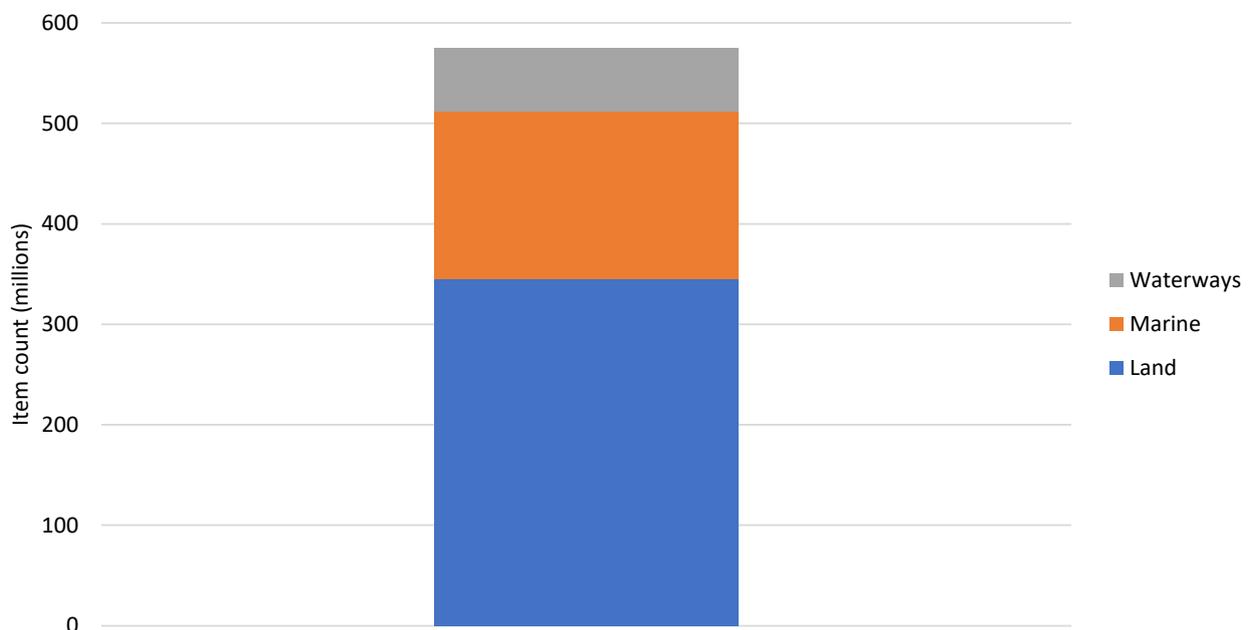
<sup>4</sup> Expressed as numbers of items collected

Program—Key Littered Items Study (KLIS) has been monitoring litter at coastal sites (estuaries and beaches) in NSW since 2017. Data from the study indicates that plastic items were the most prevalent material in marine debris, comprising about 46% of items across all surveyed sites in the period from 2017 to 2019 (Smith et al. 2020). Proportionately, the prevalence of plastics in marine litter is consistently higher than corresponding estimates from land-based surveys of litter<sup>5</sup>.

Analysis of the quantity of plastic litter generated in NSW (Marsden Jacob 2020) estimates that the total quantity of plastic litter generated in NSW was about 575 million items in 2019 (or 2,064 tonnes). Approximately 29% of this litter (167 million items) is estimated to have accumulated in marine environments (beaches, estuaries and oceans), with another 11% (63 million items) accumulating in waterways. The other 60% remains on land (Figure 1).

Litter accumulating in marine environments and, to a lesser extent, waterways is especially problematic because of the impacts it can have on marine ecosystems and the difficulty of removing it once it has entered those environments. These issues are discussed in the sections following.

**Figure 1. Plastic litter in NSW, by location (2019–20)<sup>6</sup>**



## Impacts of plastic litter on marine environments

Plastic litter in the marine environment is particularly concerning because of its persistence, its effects on marine ecosystems and, potentially, on human health. Once plastic enters the marine environment, it becomes very difficult, if not impossible, to remove. The health of marine ecosystems can be greatly affected by marine litter. Plastic marine litter can damage habitats, entangle wildlife, cause injury via ingestion, impair vessel engines, create navigation hazards, and transport non-native species.

### Indefinite lifespan of plastic litter

Plastic marine litter is a mixture of plastic polymers and chemicals ranging in size from a few nanometres to several metres. Plastics of all types have the potential to remain in marine and terrestrial environments indefinitely. Most of the commonly used plastics can break into smaller

<sup>5</sup> Based on comparisons between KLIS data and National Litter Index (NLI) data. Smith et al. (2020) have found that the proportion of plastics in marine litter is typically double that of litter on land.

<sup>6</sup> Source: Marsden Jacob 2020

and smaller pieces, many becoming microplastics<sup>7</sup>. This is particularly true of oxo-degradable plastics. Oxo-degradable plastics contain additives that hasten the breakdown of the plastic into microplastics on exposure to oxygen.

Microplastics are extremely difficult to remove from the environment and can make their way into marine environments more quickly than larger plastic items. Once in the marine environments, they will never fully degrade due to cold temperatures, reduced sunlight, and the chemical composition of the polymers. Even plastics labelled as 'biodegradable', which may break down in industrial composting facilities, are not designed to quickly degrade in ordinary household compost, soil, or in the marine environment (Thevenon, et al. 2014).

### Natural system impacts

Researchers are actively examining the physical and chemical effects of ingesting plastics on organisms and how those chemicals may travel through the food web. Millions of animals are estimated to be killed by plastics every year, from birds to fish to other marine organisms. Nearly 700 species, including endangered species, are known to have been affected by plastics. Nearly every species of seabird is known to consume plastic (Lau et al. 2020; Thevenon et al. 2014; Thompson et al. 2009).

Most animal deaths are caused by entanglement or starvation. Seals, whales, turtles, and other animals are strangled by abandoned fishing gear or discarded 6-pack rings. Microplastics have been found in more than 100 aquatic species, including fish, shrimp, and mussels destined for human consumption. In some cases, these small pieces pass through the digestive system and are expelled without consequence. Plastics have also been found to have blocked digestive tracts or pierced organs, causing death. Stomachs that are packed with plastics reduce the urge to eat, causing starvation (Cozara et al. 2014; Rochman et al. 2016; Thevenon et al. 2014; Thompson et al. 2009).

In addition to the detrimental consequences of ingestion of plastics by marine biota, environmental consequences of marine litter also stem from microplastics and nanoplastics. These plastics potentially affect marine biota both from their physical nature if ingested and by transfer of chemicals associated with them, including persistent organic pollutants and endocrine disruptor chemicals. Tests have also confirmed liver and cell damage and disruptions to reproductive systems, prompting some species, such as oysters, to produce fewer eggs. Research also shows that larval fish are eating nanofibers in the first days of life, raising questions about the effects of plastics on fish populations (Gallo et al. 2018; Thevenon et al. 2014; Thompson et al. 2009).

### Plastic microbeads in personal care products

Plastic microbeads are small, solid manufactured plastic particles that have an upper size limit of 5 mm in diameter that are water insoluble and non-degradable. They typically have diameters of around 0.1 to 0.3 mm. The use of plastic microbeads and other non-soluble plastic polymers has been reported in a range of personal care products such as deodorant, shampoo, conditioner, shower gel, toothpaste, hair colour, hair spray, shaving cream, sunscreen, insect repellent, baby care products, anti-wrinkle creams, moisturisers, facial masks, and other cosmetics. The use of plastic microbeads has also been reported in some cleaning products.

The size of plastic microbeads and the nature of their use means that it is not feasible to accurately quantify (either in count, volume or weight terms) how much is currently used in personal care products. Nor is it feasible to quantify plastic microbeads that are entering land and marine environments following their use.

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<sup>7</sup> Microplastics are defined as particles of plastic <5 mm in diameter, and nanoplastics as particles <100 nm in at least one of its dimensions. Most microplastics and nanoplastics originate from the degradation of macroplastics through photodegradation and other weathering processes. They may also be present as deliberately manufactured plastic microbeads used as scrubbing agents in some personal care and cosmetic products (Gallo et al. 2018).

However, recent studies provide an indication of the scale of use of products containing plastic microbeads:

- A 2017 survey of relevant products undertaken for the Australian Department of Environment and Energy (Envisage Works, 2018) found that 267 of 4,400 surveyed products (6.0%) contained plastic microbeads or other non-soluble plastic polymers. Some 67% of products containing plastic microbeads were cosmetics, with another 30% being facial scrubs/skin creams.
- A subsequent survey undertaken for the Australian Department of Agriculture, Water and Environment (Envisage Works, 2020) of rinse-off personal care, cosmetic and cleaning products found that 58 of 8,100 surveyed rinse-off products (0.7%) contain plastic microbeads.

Differences in these results should be viewed in context of the different focuses of the 2 surveys, with the second survey looking only at 'rinse-off' products, which are a subset of all personal care, cosmetic and cleaning products<sup>8</sup>. Differences in the survey results should also be viewed in context of a 2016 meeting of environment ministers, which agreed to support a voluntary industry phase-out of plastic microbeads found in rinse-off personal care, cosmetic, and cleaning products sold in Australia<sup>9</sup>. Differences in results of the surveys could also, in part, reflect different sample sizes of the 2 surveys, with the second survey having a substantially greater sample size.

### Impacts of plastic litter on terrestrial environments

Plastic litter can also have significant impacts on terrestrial environments. Plastic pollution of soils poses a significant threat to soil health and fertility. Chemicals commonly added to plastics, such as polybrominated diphenyl ethers and other brominated flame retardants, are likely to be present in microplastics in soils, representing a potential harm to human health (Gionfra, 2018; Stubenrauch & Ekardt, 2020).

As with marine species, ingestion of plastic by terrestrial birds and mammals poses a threat to their survival (Thompson et al. 2009). Plastic litter in public areas such as beaches, reserves and parks, streets can also have significant health and visual amenity impacts.

### Impacts of plastic production on greenhouse gas emissions

As well as the impacts of plastic litter on our marine and terrestrial environments, plastic production and disposal poses a significant threat to the Earth's climate. Nearly all plastic begins life as a fossil fuel. Greenhouse gases are emitted at each stage of the plastic lifecycle:

- fossil fuel extraction and transportation
- plastic refining and manufacture
- plastic waste management
- ongoing impacts on our oceans, waterways and landscapes.

If plastic production and use grow as currently predicted, global emissions from this industry could reach 1.34 gigatons by 2030. The contribution of the accumulated emissions could reach over 56 gigatons by 2050, or 10–13% of the total remaining carbon budget if we are to keep warming to below 1.5°C (CIEL, 2019).

<sup>8</sup> Rinse-off products, as distinct from 'wipe-off' or 'leave-on' products, are designed to be used once and then rinsed off or flushed down the drain. As they are not captured by wastewater treatment systems, they are very likely to enter waterways and marine environments.

<sup>9</sup> The voluntary phase out is being led by Accord Australasia (a national industry association representing manufacturers and suppliers of hygiene and cosmetic products) and overseen by the Australian Department of Environment and Energy (now DAWE) and the NSW EPA. To support the ongoing success of the voluntary phase-out, the Australian Government issued Accord Australasia with a monitoring and assurance protocol in December 2018.

# Rationale for government action in NSW

## Market failures

If consumers directly bear the full costs of their consumption and fully understand the implications of their consumption decisions, then the market will, in principle, lead to efficient outcomes. However, the consumption of problematic plastics such as single-use and oxo-degradable plastics exhibits several 'market failures' (Table 3).

**Table 3. Market failures associated with the consumption of problematic plastics**

Market failure	Summary
Public good	Oceans, bays, waterways and terrestrial reserves (coastal and non-coastal) are public goods, being freely available to all members of society. This can lead to their misuse.
Negative externalities	Manufacture, design and use of plastic products and their disposal has negative spill-over effects on marine environments, carbon emissions and recycling systems, which are not reflected in prices of the plastics.
Imperfect information	Sellers and consumers lack information or the right type of information to enable them to make informed decisions on the sale, purchase and use of plastic items, potentially leading to their overuse and inappropriate disposal.

### Public good

Oceans, bays, estuaries, and waterways are public goods. They are:

- non-excludable, meaning that individuals are generally not excluded from using them.
- non-rivalrous, meaning their use by one individual does not prevent their use by another.

These characteristics allow them to be overused or misused. Oceans, bays and waterways have, either inadvertently or deliberately, been used as 'receptacles' for the disposal of problematic plastic waste such as single-use items and packaging.

The misuse of oceans, bays and waterways often stems from a lack of accountability for key decisions about the use of plastic items, notably in relation to their post-use disposal. Littering of plastic items – frequently leading to pollution of oceans, bays, or waterways – can often be done with impunity. While littering is against the law under the NSW *Protection of the Environment Operations Act 1997* and subject to significant fines, in practice the law is difficult to enforce in many circumstances, either because in many locations it is relatively easy to engage in littering undetected, or because it can be unintentional (for example, from overflowing public bins).

### Negative externalities

Negative externalities related to the use and disposal of plastics fall into 5 main areas<sup>10</sup>:

- degradation of natural systems because of plastic litter in oceans, bays and waterways
- direct economic costs associated with incorrect disposal of plastics
- costs associated with reducing carbon emissions and the future impacts of climate change
- amenity impacts of littered plastics
- health impacts from substances of concern in plastics.

<sup>10</sup> Upstream impacts such as emissions associated with plastics production is not discussed in this BRS. These upstream impacts are largely outside of scope of the BRS, since most of the impacts are likely to occur outside of NSW.

## Impacts on natural systems

The impacts of plastic litter are discussed at length in the section ‘Impacts of plastic litter on marine environments’ on pages 10. *Valuing plastic*, a 2014 study for the United Nations Environment Programme (UNEP) and the Plastics Disclosure Project (PDP), has estimated the ‘natural capital cost’<sup>11</sup> of plastics production and use (UNEP 2014). Much of the study focusses on up-stream impacts, but it also assesses downstream impacts on marine environments drawing on willingness-to-pay (WTP) studies of the value that society puts on marine species.

Costs to the marine environment of plastic litter were estimated in the study to be about US\$13 billion per annum (A\$15 billion, 2019). The study’s authors stress that this estimate does not include the impacts of microplastics. Although detailed regional breakdowns of this estimate are not provided, based on data provided for the Oceania region, on a per-capita basis, this equates to a WTP of approximately \$33 million per annum to avoid the impacts of plastic litter on marine environments in NSW.

## Direct economic costs

Plastic litter can also induce direct economic costs by clogging sewers, stormwater drains and other urban infrastructure or through expenditure on preventative measures. For example, a 2016 survey of NSW local councils, public and private land managers and community groups found that more than \$180 million is spent each year on managing litter including on litter bins, litter traps and litter clean-up (NSW Environment Protection Authority 2019).

## Amenity impacts

The amenity impacts of plastic litter include the adverse impacts that litter can have on people’s enjoyment of an area. As with the impacts of litter on natural systems, most attention in this area has been on the amenity impacts of litter in coastal and marine environments.

Some WTP studies do not distinguish between the natural systems and amenity impacts of litter, which is the case with the WTP estimates used in the supporting cost-benefit analysis (Marsden Jacob 2020). However, it is feasible to specifically assess the impacts of litter on recreational and other amenity values.

One recent US study has done this, estimating the change in economic value (increase or decrease) that could result from decreasing or increasing the quantity of litter on beaches (Bear Peak Economics 2019). Preliminary estimates from the study indicate that eliminating litter from beaches would increase the economic value of beach recreation in 4 different states by US\$10 million to \$130 million per year (A\$14 million to \$186 million per year).

No similar studies have been completed to date in NSW or elsewhere in Australia.

## Health impacts

Reviews of the potential health impacts of plastics in marine environments emphasise that uncertainties are high and data gaps very large on the potential health impacts of plastics on humans (Gallo et al. 2018; Lusher et al. 2017, Thompson et al. 2009). There is a lack of knowledge about the consequences of the uptake of microplastics and nanoplastics through marine food chains. For example, a recent report of the Food and Agricultural Organisation on food safety concludes that basic toxicological data are lacking on the food safety risk of consumption of microplastics and nanoplastics in humans (Lusher et al. 2017).

## Information failure

Information failure occurs when some, or all, of the participants in an economic exchange do not have perfect knowledge of the systems they are engaging with. In the case of plastic products, both sellers and consumers often lack information, or the right type of information, to enable them

<sup>11</sup> Defined as the financial cost to companies, were they to internalise impacts associated with their current practices.

to make informed decisions on the purchase, use and disposal of a plastic item. This can lead to overuse of the products and inappropriate disposal at the end of the product's functional life.

Information failure is evident from the responses of participants in a recent survey on single-use plastics prepared for the department (IPSOS 2020). Responses indicate that while almost three-quarters of consumers agreed that taking their own bags shopping requires little or no effort, almost half of respondents use disposable plastic bags provided by retail shops and well over half use disposable plastic bags provided by takeaway food outlets. Imperfect information appears to be a factor driving this anomaly. Respondents indicated uncertainty about when a re-useable carrier bag might be needed or lack of information about practical alternatives to disposable plastics as factors influencing their decision to continue using disposable plastics.

Manufacturers may seek a competitive advantage through exploiting this information asymmetry. For example, manufacturers have incorporated and promoted oxo-degradable plastic in certain plastic products, which use additives to make the plastic break down into microplastics in the environment. The use of the term 'degradable' may mislead consumers into believing the product is better for the environment than its alternatives and could result in disposal habits such as increased littering, leading to greater adverse environmental outcomes. To illustrate this point, the Australian Competition and Consumer Commission in its assessment of the certification trademark lodged by OxoPak Pty Ltd, noted concerns about the environmental claims of oxo-degradable plastics.

## Action taken by other governments

### Bans on single-use and other problematic plastics

The United Nations Environment Programme (UNEP) has undertaken a comprehensive global review of national laws and regulations that place legal limits on the use or production of single-use plastics and microplastics (UNEP 2019). As of July 2018, 127 of 192 countries have in place some form of legislation to restrict the supply or use of plastic bags. Of these, 91 countries have some type of ban or restriction on the manufacture or production, importation, and retail distribution of plastic bags.

Additionally, 27 countries have enacted laws that place some type of ban on other single-use plastics, either on the supply and use of specific products (such as plates, cups, straws and packaging), on the supply and use of specific materials (for example, polystyrene or oxo-degradable plastic) or on their use in production processes.

Countries/regions that have implemented or propose to implement bans or phase out of single-use plastic items are listed in **Error! Reference source not found.**

Additionally, there are sub-national (state, province, city) bans in other countries including states in the USA (California, Hawaii, Washington) and the Indian state of Maharashtra.

In Australia, most jurisdictions are actively examining or implementing options to phase out the use of single-use or problematic plastics.

On 1 March 2021, South Australia became the first Australian state to ban single-use plastic straws, stirrers, cutlery, with expanded polystyrene (EPS) food service items and all oxo-degradable products to be banned in 2022. In 2009, South Australia also became the first Australian jurisdiction to ban lightweight single-use plastic bags.

ACT and Queensland have both recently commenced a ban certain single-use items such as plastic cutlery, straws, stirrers, single-use plates and bowls and EPS food service items. These bans took effect from 1 July and 1 September 2021 respectively. Queensland banned lightweight single-use plastic bags from 2016, while the ACT banned lightweight bags in 2011.

In November 2020, Western Australia announced its Plan for Plastics, committing to phasing out several single use items. This includes plastic plates, bowls, cups and their lids, cutlery, stirrers, heavyweight plastic bags, EPS food containers and helium balloon releases by July 2022.

Additional products, including barrier/produce bags, microbeads, EPS packaging, single-use plastic cotton buds and oxo-degradable plastics will be phased out by the end of 2022. Lightweight, single-use plastic bags have been banned since 2018.

**Table 4. Countries/regions that have implemented or propose to ban or phase out plastic items<sup>12</sup>**

Country/region	Items being phased out	Phase out date
Antigua and Barbuda	Polystyrene containers for food service	2018
China	All non-biodegradable plastic bags, disposable foam, plastic tableware, and plastic cotton swabs	2020–22
Costa Rica	All single-use plastics including bottles, bags, cutlery, straws, Styrofoam containers and coffee stirrers	2017–21
European Union	Single-use cutlery and plates, plastic straws, plastic cotton bud and balloon sticks, oxo-degradable plastics, expanded polystyrene cups	2021
France	Plastic cups, plates, and cutlery	2020
Guyana	All polystyrene containers for food service	2016
Haiti	All polystyrene products	2013
Marshall Islands	Polystyrene cups and plates, disposable plastic cups and plates, plastic bags	2016
Monaco	Plastic utensils unless they are made of 'biobased' materials	2017
Peru	Single-use plastic bags and other unrecyclable plastics	2018–21
Rwanda	Lightweight single-use plastic bags Straws, coffee stirrers, soda and water bottles, plastic cutlery, balloons and almost all food packaging	2008 2020
Saint Vincent and the Grenadines	All expanded polystyrene products in the food service industry	2018
Saudi Arabia	All polypropylene and polyethylene plastics intended for one-time use	2020
Seychelles	All polystyrene boxes and plastic utensils	2017
Sri Lanka	Food containers, plates, cups, spoons and shrink wrap made from polystyrene, polymers of ethylene, styrene, and vinyl chloride	2018
Taiwan	All single-use plastic items	2030
United Arab Emirates	Non-biodegradable semi-rigid plastic packaging for food, magazines, consumer durables, garbage bags, shrink wrap, pallet wrap	2015
Vanuatu	Plastic straws and polystyrene products, including takeaway boxes, food packaging, disposable plates and cups, and horticultural netting	2015

In February 2021, Victoria announced their commitment to phase out single-use plastic straws, stirrers, cutlery, plates, EPS food service items and single-use plastic cotton buds by February 2023.

In March 2021, the Australian Government published the National Plastics Plan, incentivising industry to, among other things, phase out degradable plastic packaging, EPS loose fill and

<sup>12</sup> Source: UNEP 2019

moulded packaging by July 2022 and EPS food service items and PVC packaging labels by December 2022.

Tasmania and the Northern Territory have both banned lightweight single-use plastic bags, from 2013 and 2011 respectively.

At the federal level, the National Waste Policy and Action Plan has a target to phase out problematic and unnecessary plastics by 2025.

## Design standards

Several international jurisdictions are proposing design standards.

In 2019, the European Union (EU) introduced a standard for bottle caps to be tethered to all single-use plastic beverage containers by 2024.

The EU have also issued a directive for all PET plastic bottles below 3 litres to contain a minimum 25% recycled content by 2025 and 30% by 2030.

In 2020, the UK announced a new tax on plastic packaging that contains less than 30% recycled content, at a rate of £200/tonne, to take effect from April 2022.

In September 2020, California passed a Bill to mandate 50% recycled content in plastic beverage containers by 2030. This is the toughest requirement globally for recycled content. The Bill requires sign off from the Californian governor, however, a similar Bill was vetoed by the governor in 2019.

Within Australia, no state or national government has established a design standard power to address plastics. However, in September 2020, South Australia passed legislation prohibiting the sale, supply, distribution or manufacture of oxo-degradable plastic within the state. Other states such as Queensland and the ACT have indicated their intention to prohibit oxo-degradable plastics in the coming years.

Since 2017, the Australian Government and the NSW Environment Protection Authority have led the voluntary industry agreement to phase out the use of plastic microbeads in rinse off personal care products. Recent assessment of the effectiveness of this voluntary action, conducted in 2020, showed that 99.3% of in scope products are microbead free, however the remaining products are still a concern.

## The NSW Plastics Action Plan

The NSW Plastics Action Plan commits to actions to address the entire lifecycle of plastics, from production through to disposal and management of waste. These actions are consistent with actions implemented elsewhere in Australia and the world. This commitment includes the prohibition of certain problematic plastics such as single-use plastics and microbeads in rinse off personal care products and seeks to meet the NSW Government targets to:

- phase out key single-use and problematic plastic items
- reduce plastic litter items by 30% by 2025.

Single-use plastic items being considered for phase out include<sup>13</sup>:

- lightweight plastic shopping bags (35 microns or less)
- heavyweight plastic shopping bags (greater than 35 microns), including reusable shopping bags used in supermarkets and single-use, boutique-style plastic bags used in department stores and boutique retailers
- expanded polystyrene food and beverage containers
- single-use plastic plates, bowls, cups, cutlery, stirrers, and other single-use food service items

<sup>13</sup> Referred to hereafter as 'single-use plastics' or 'single-use plastic items'

- single-use plastic cotton buds
- single-use plastic straws.

In addition, the use of oxo-degradable plastic and plastic microbeads in personal care products will be considered for phasing out under a design standard.

## Consequences of not acting

### Plastics consumption and litter rates in NSW

An estimated 1.13 million tonnes of plastics were consumed in NSW in 2019–20 (Envisage Works & SRU 2020 and Marsden Jacob 2020). Of this, 2.2% (25,009 tonnes) were in-scope, single-use and oxo-degradable plastics (Table 5).

An estimated 2,064 tonnes of plastics were littered in NSW in 2019–20, meaning that the litter rate of all plastics consumed is only about 0.2%. The litter rate of single-use plastics, by contrast, is estimated to be about 3.9% (970 tonnes), 20 times the litter rate of all plastics.

The major factors driving the relatively high litter rate of single-use plastics is the nature of the products they comprise and their places of use. Whereas most plastics are used in durable products and are consumed primarily at home or in places of business, single-use plastics, by their nature, are disposed of very soon after their initial use. Moreover, many are consumed in public places such as parks and gardens, streets, beaches, and highways. Specific data is not available for the proportion of single-use plastics that are consumed in public places. Based on an estimated rate of 15–20%<sup>14</sup>, this would indicate a litter rate of over 20% for single-use plastics consumed in public places, more than 100 times the litter rate of plastics that are consumed at home or in places of business.

**Table 5. Consumption and littering of plastics in NSW, 2019–20<sup>15</sup>**

Plastics	Consumption (tonnes)	Litter (tonnes)	Litter rate
All plastics	1,134,196	2,064	0.2%
Single-use and oxo-degradable plastics	25,009	970	3.9%

The size of plastic microbeads, and the nature of their use means that it is not feasible to accurately quantify plastic microbeads that are currently used in personal care products. Nor is it feasible to quantify plastic microbeads that are entering land and marine environments.

### Rates, destination, and projections of single-use plastic litter in NSW

Table 6 provides estimates of single-use plastic and oxo-degradable plastic litter in NSW in 2019–20, by litter type. Data in the table was drawn from litter analysis conducted for the cost-benefit analysis that supports this BRS (Marsden Jacob Associates 2020)<sup>16</sup>.

<sup>14</sup> Data provided for the national packaging impacts decision regulation impact statement (Marsden Jacob 2013) suggests that about 15–20% of plastics packaging, most of which is used in single-use items, is consumed in public places.

<sup>15</sup> Sources: Envisage Works & SRU 2020, Marsden Jacob 2020

<sup>16</sup> The litter analysis in turn drew on data from NLI data and Key Littered Items Study (Foulsham et al. 2020).

**Table 6. Quantities and rates of littering of different types of single-use and oxo-degradable plastics, NSW, 2019–20<sup>17</sup>**

Single-use plastic litter type	Litter (tonnes)	Litter (millions of items)	Litter rate (%/tonne cons.)
Lightweight plastic shopping bags	87.2	24.2	2.2%
'Reusable' heavyweight plastic shopping bags	44.6	2.3	0.9%
Disposable plastic plates, cutlery, etc.	721.0	138.7	5.9%
Expanded polystyrene food and beverage containers	17.1	5.6	4.0%
Plastic straws	42.9	92.2	6.3%
'Single-use' heavyweight boutique plastic bags	4.6	0.2	0.9%
Oxo-degradable plastics	52.0	0.8	2.2%
Single-use plastic cotton buds	0.1	0.9	0.15%
Total single-use plastics	969.5	265.0	3.9%

The biggest quantity of single-use plastic litter (both by weight and numbers of items) is disposable plastic plates/bowls, cutlery, cups, stirrers, and other single-use food service items. These comprised more than 50% of single-use plastic litter by numbers of items (139 million). The litter rate of these items is estimated to be almost 6% (6% of all items consumed are littered). The rate of littering of these items when consumed in public places is almost certainly much higher than this – possibly as high as 33%.

Other single-use plastics types that have high litter rates include plastic straws and expanded polystyrene food and beverage containers. Lightweight single-use plastic bags have lower littering rates (possibly because relatively low proportions of the bags are used in public places) but are still responsible for 9% (24 million items) of single-use plastic litter<sup>18</sup>.

Figure 2 provides estimates of the projected growth in single-use plastic litter and the destination of that litter. Numbers of single-use plastic litter are projected to grow from 265 million in 2019–20 to 353 million in 2039–40. This growth reflects annual growth in consumption of about 1.5% and a more-or-less constant littering rate.

Litter counts for NSW were estimated for the cost-benefit analysis based on analysis of National Litter Index (NLI) data, Key Litter Items Study (KLIS) data, and a review of the relevant literature. The propensity to litter for each item type is calculated by dividing litter totals by their corresponding consumption totals. These estimates (up to this point, based only on NLI data) must be scaled up to account for plastic litter in the marine environment (beaches, bays, estuaries, and oceans) and waterways.

About 40% of all single-use plastic litter in NSW is estimated to end up in marine environments (29% in bays, estuaries, and ocean) and waterways (11%). This is significant given the impacts of plastics on aquatic ecosystems and the difficulty of cleaning-up litter from those environments. Because the litter does not break down in the environment it will continue to accumulate over time.

This means only 60% of plastic items that are littered each year are captured in the NLI data set. The final adjustment is to scale the previous estimates by a factor of  $1/0.6 \approx 1.67$  to account for plastic litter ending up in the marine environment and waterways.

<sup>17</sup> Source: Marsden Jacob 2020

<sup>18</sup> Consumption and litter estimates of lightweight, single-use plastic bags are substantially lower in 2019–20 than they were prior to the voluntary ban on the supply of these items by major supermarkets, initiated in 2017.

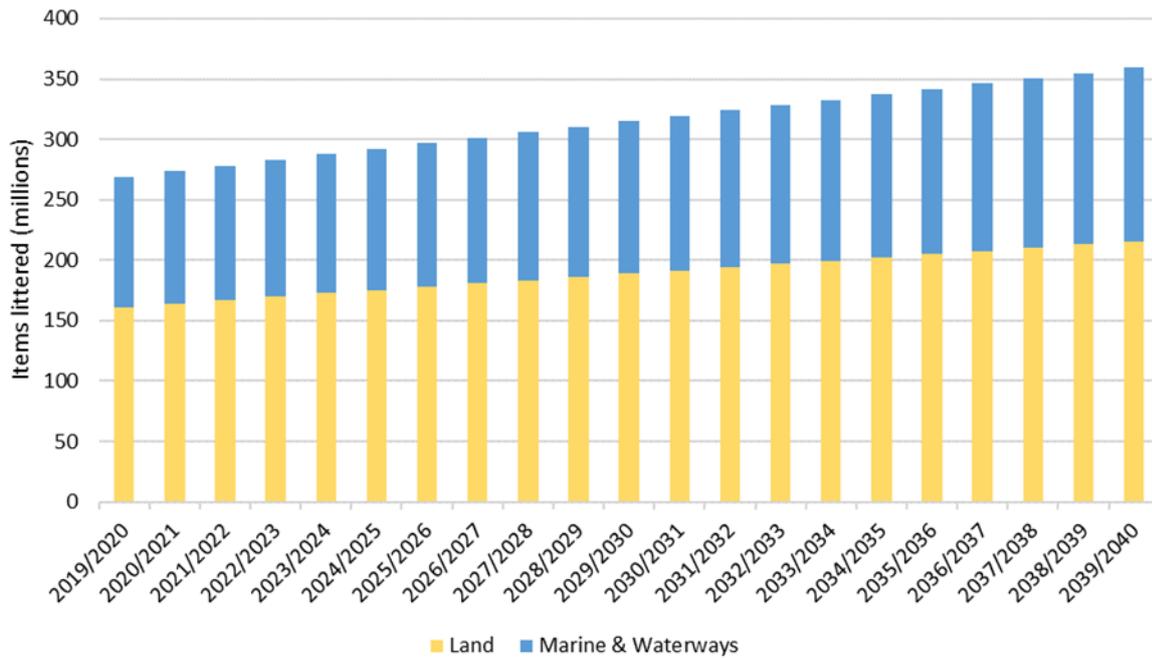


Figure 2. Single-use plastic litter projections by destination, 2019–20 to 2039–40<sup>19</sup>

### Cost of plastic litter in NSW

Interpolation of data from an international WTP study of the costs of plastic litter on marine environments (UNEP 2014) indicates a WTP of approximately \$33 million per annum to avoid the impacts of plastic litter on marine environments in NSW. This estimate can be compared with WTP and avoided clean-up cost values that have been estimated as part of the cost-benefit analysis that supports this BRS (Marsden Jacob 2020). Estimates completed for the cost-benefit analysis indicate approximate values respectively of:

- \$54 million in 2019–20, WTP to avoid plastic litter in NSW (excluding microplastics), including both marine and land-based plastic litter
- \$49 million in 2019–20, weighted average cost of cleaning up plastic litter in NSW (excluding microplastics), including both marine and land-based plastic litter.

These estimates can be regarded as lower-bound estimates of the annual cost of plastic litter in NSW because:

- as noted, none of the estimates include the impacts of microplastics
- with respect to the UNEP WTP study, interpolated estimates for NSW do not distinguish between the demographic and economic circumstances in NSW and elsewhere in Oceania and do not include the economic costs of land-based plastic litter
- with respect to the WTP study from which the estimate for the supporting cost-benefit analysis was derived, minimal attention was given to the specific impacts of litter on marine environments. While the WTP study may well to provide a reasonable estimate of the economic costs of the 60% of plastic litter that is land-based, the study almost certainly understates the economic cost of marine litter
- with respect to the clean-up cost estimates, costs are based on the average clean-up costs of methods currently employed, which inevitably cannot clean-up all litter, especially from marine environments. Even if the task were to be attempted, the marginal cost of cleaning up the last few percent of litter from marine environments is likely to be extremely high.

<sup>19</sup> Source: Marsden Jacob 2020

## The government needs to intervene

The impacts of plastic litter on marine ecosystems in NSW and the market failures that contribute to those impacts point to the need for government intervention.

Available evidence from clean-up programs indicates that it is very difficult and costly to clean-up litter once it has entered marine environments. The small size of microplastics renders this debris untraceable to its source and almost impossible to remove from marine environments. Once plastics are in the marine environment therefore, they will continue to accumulate.

The most effective mitigation strategy for marine plastic litter is to reduce inputs – either through litter reduction strategies or through improving the design of plastic products and using phase outs to reduce the consumption of plastic items that have the greatest potential to be littered.

## Options for government action

Single-use and other problematic plastic items, such as oxo-degradable plastics, are collectively one of the largest contributors to the litter stream, causing significant environmental damage. This BRS considers options to reduce the use and impacts of these problematic plastics.

### Reducing the impact of single-use and problematic plastics

The department considered 3 options for government action to address the adverse impacts of single-use and problematic plastics (Table 7). The options include regulatory intervention to prohibit the supply of various problematic and unnecessary plastic items and setting design standards to limit use of problematic items, improve litter infrastructure in public places, and introduce a voluntary program of not supplying and using single-use plastics. These options could potentially be implemented in combination with each other, but for this analysis the options were assessed individually. The options were assessed against a continuation of the status quo (the base case option).

**Table 7. Options for government action**

Option	Description
Base case	Continuation of the status quo
Option 1 and 1b <sup>20</sup>	Phase out supply of problematic single-use plastics and set design standards to prohibit the use of oxo-degradable plastics and microbeads in personal care products, combined with public education
Option 2	Improve waste disposal/litter infrastructure in public places, combined with community education
Option 3	Voluntary program in designated regions and towns to not supply and use single-use plastic items

#### Base case

The base case option assumes that there is no change to current measures relating to consumption of single-use and problematic plastic and litter control. This means:

- continuing the 'Don't Be a Tosser' litter education campaign that has been undertaken by the NSW Government since 2014
- grants to councils and community groups to tackle litter hotspots through the 'Waste Less Recycle More' program
- continuing and expanding the NSW container deposit scheme, 'Return and Earn'.
- litter enforcement through the *Protection of the Environment Operations Act 1997*.

#### Options

##### Option 1: Banning problematic plastics, including certain single-use plastics and oxo-degradable plastics

Under Option 1, legislation will be introduced to phase out the supply of various single-use plastic items and set design standards for problematic plastic products.

<sup>20</sup> A variant of Option 1, Option 1b involves legislated phase out of a smaller range of single-use plastic items was also assessed as a sensitivity (single-use plastic cups and bowls with lids will not be phased out. Heavyweight plastic bags will be subject to a voluntary industry phase out and a design standard will not be set to prohibit oxo-degradable plastics).

Items considered for phase out include:

- lightweight plastic shopping bags 35 microns or less, including those made from 'degradable' and 'compostable' plastic<sup>21</sup>
- heavyweight plastic shopping bags greater than 35 microns<sup>22</sup>
- expanded polystyrene food and beverage containers<sup>23</sup>
- single-use plastic plates, bowls, cups, cutlery, stirrers, and other single-use food service items
- single-use plastic cotton buds
- single-use plastic straws<sup>24</sup>.

Design standards under consideration include:

- prohibition of products made from or containing oxo-degradable plastics
- prohibition of personal care products containing plastic microbeads.

Options for replacing the prohibited plastic items include:

- single-use items made from alternative materials such as cardboard or wood (such as for straws, plates, cutlery). Compostable or biodegradable plastics will not be considered a suitable replacement
- multiple-use items (such as reusable shopping bags)
- not replacing them (avoiding them) because consumers choose not to use one (such as straws, bags).

The decision on the replacement option will be left to retailers and consumers.

The legislation prohibiting these items will be accompanied by a statewide information and education campaign undertaken before, during and after the phase out period. The information campaign will be ongoing and involve social media and other, more traditional forms of media. Its purpose will be to:

- explain why single-use and other problematic plastics are being prohibited, focusing on the impacts of problematic plastics on the marine environment (before and during phase out)
- discuss replacement alternatives to the prohibited items (during and after prohibition)
- encourage consumers to use multiple-use replacement items or not use any replacement items (during and after prohibition).

### Option 1b:

Option 1b is a variant on Option 1. A smaller range of problematic plastics will be phased out. Under this variant, single-use plastic cups and bowls with lids are not phased out, while heavyweight plastic bags will be subject to a voluntary, industry-led phase out. A design standard banning the use of oxo-degradable plastics is not set.

<sup>21</sup> Excludes: plastic bags that are used to ship products to the shop from the manufacturers or suppliers (i.e. primary packaging); plastic bags that come with the product on the shelf (i.e. secondary packaging, such as bread bags and bait bags); plastic bags that are sold as packaged products in stores (for example, Ziplock bags, animal waste bags and bin liner bags).

<sup>22</sup> Such as the 'reusable' heavyweight plastic bags available at supermarkets for a small fee or the 'single-use' heavyweight bags provided by department stores or boutique retailers. Does not include 'green' non-woven reusable bags.

<sup>23</sup> Excludes: business-to-business fresh produce boxes; loose fill EPS 'peanuts' used to prevent movement and for cushioning in consumer and business-to-business packaging; dry bulky goods packaging; and specialist applications packaging used for insulation and/or cushioning for transport or storage.

<sup>24</sup> Excludes straws that are part of a ready-to-consume product, such as a juice box, durable plastic straws that are a component of the product itself (for example, thick straws in reusable sports drink bottles) and medical-enabling straws.

## Option 2: Litter infrastructure and service investments

Option 2 will involve a grants program to fund the cost of installing additional litter collection and clean-up infrastructure. Infrastructure to be funded will include public litter bins and public litter traps. Organisations eligible for funding will include:

- local councils, including NSW local Aboriginal land councils
- the National Parks and Wildlife Service
- the Forestry Corporation
- other organisations responsible for managing litter in public places.

Priority will be given to funding infrastructure at litter ‘hotspots’, especially in coastal areas.

The funding program will run for 3 years and provide funding for up to 6,000 new litter bins (including housing) and 250 litter traps.

The infrastructure program will be supported by a statewide information and education campaign. The campaign, which will complement the ‘Don’t Be a Tosser’ campaign, will:

- explain the impacts of plastic litter, especially on the marine environment
- encourage consumers to use public litter bins and to not litter in coastal areas.

## Option 3: Program to support voluntary phase out of single-use plastics

Option 3 will involve a program to encourage communities in designated regions and towns to voluntarily adopt policies to not supply and use single-use plastic items. The program will be modelled on community-based initiatives that have been undertaken in NSW and elsewhere in Australia. It will involve 2 phases:

- Phase 1 will encourage the café and hospitality and events sectors to designate ‘plastics free’ precincts (cities, towns, or local government areas) to switch away from supplying single-use plastic items. The single-use plastic items will be the same as those identified under Option 1.
- Phase 2 will develop new collection services and processing infrastructure for single-use alternatives so that a ‘closed loop’ system replaces single-use plastics.

There are numerous potential variations to this option involving different scales and focus regionally. The version of the program modelled for this analysis involves funding of up to 30 precincts, with the focus being on towns, cities, and local government areas in coastal regions.

## Impacts of options on litter

Figure 3 and Table 8 provide estimates of plastic litter avoided under each of the options relative to the base case. The estimates are sourced from a comprehensive materials and litter flows analysis that was undertaken for the cost-benefit analysis that supports this BRS (Marsden Jacob 2020). Details of the approach to assessing the avoided litter are provided in the cost-benefit analysis.

Option 1 would achieve by far the greatest reduction in-scope plastic litter, estimated to be approximately 5,482 million items (21,420 tonnes) over 20 years. By year 3, nearly all in-scope plastic litter would be avoided under Option 1, representing an estimated 45% of all plastic litter being avoided over the 20-year period, based on numbers of littered items. This option has the benefit of also reducing the amount of plastic being sent to landfill and therefore removed from the circular economy.

Option 1b would achieve a reduction in plastic litter of 5,643 tonnes, which is substantially lower than Option 1. However, this option would still achieve a significantly higher reduction in plastic litter compared to both Options 2 and 3.

Option 2 is estimated to achieve a reduction in in-scope plastic litter of approximately 467 million items (1,711 tonnes) over 20 years. Additionally, Option 2 will achieve a reduction in litter of other

plastic items of approximately 531 million items (1,949 tonnes) over 20 years. The total reduction in litter achieved by Option 2 represents an estimated 8% of all plastic littered over this period, based on numbers of littered items.

Option 2 would also achieve a reduction in other, non-plastic litter. This has not been quantified.

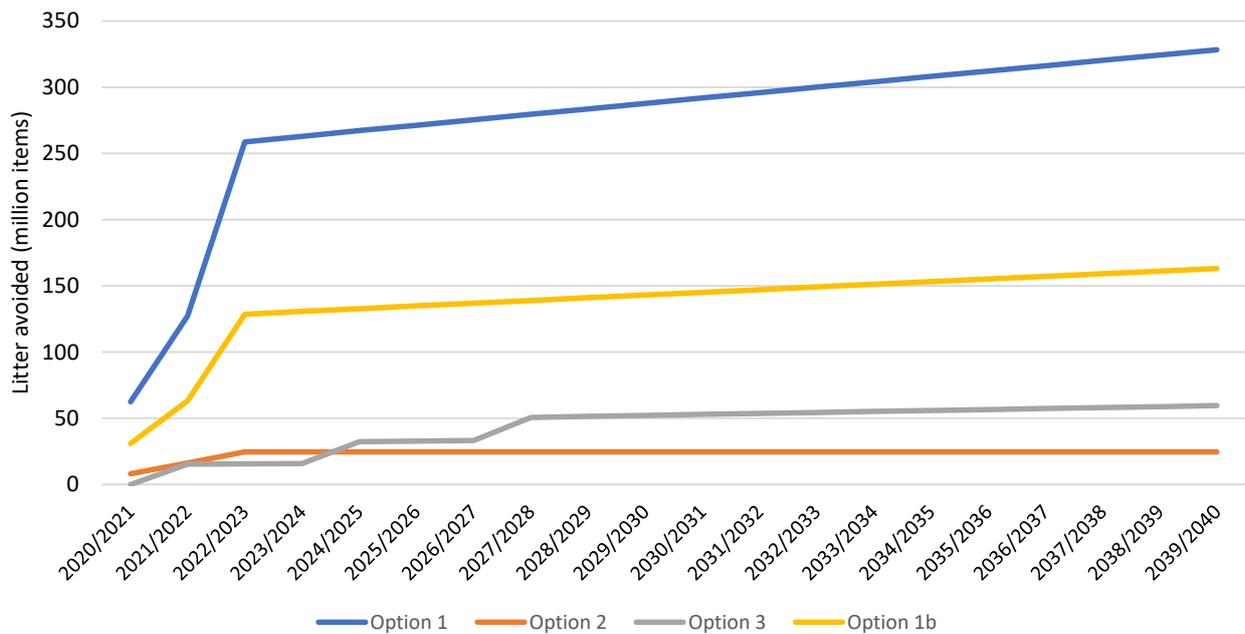
Option 3 is estimated to achieve a reduction in in-scope plastic litter of approximately 572 million items (1,974 tonnes) over 20 years. The total reduction in litter achieved by Option 3 over this period is estimated to be approximately 4% of all plastic littered over this period, based on numbers of littered items.

**Table 8. Total plastic litter avoided over 20 years, options 1, 1b, 2, and 3<sup>25</sup>**

Plastic item	Op. 1 Million items	Op. 1 Tonnes	Op. 1b Million items	Op. 1b Tonnes	Op. 2 Million items	Op. 2 Tonnes	Op. 3 Million items	Op. 3 Tonnes
Lightweight plastic shopping bag	539	1,944	539	1,944	42	151	61	220
'Reusable' heavyweight plastic shopping bag <sup>26</sup>	51	995	41	797	4	77	6	113
Disposable plastic plates, cutlery, etc.	3,093	16,074	339	1,763	241	1,250	270	1,401
Expanded polystyrene food and beverage container	125	381	125	381	10	30	9	28
Plastic straws	1,644	765	1,644	765	160	74	217	101
'Single-use' heavyweight boutique plastic bags	5	102	4	81	0	8	1	11
Oxo-degradable plastics	18	1,158	-	-	1	90	2	101
Single-use plastic cotton buds	5	1	5	1	1	0.1	7	0.05
<b>Sub-total single-use plastic litter avoided</b>	<b>5,482</b>	<b>21,420</b>	<b>2,697</b>	<b>5,732</b>	<b>467</b>	<b>1,711</b>	<b>572</b>	<b>1,974</b>
Other plastic litter avoided	-	-	-	-	531	1,949	-	-
<b>Total plastic litter avoided</b>	<b>5,482</b>	<b>21,420</b>	<b>2,697</b>	<b>5,732</b>	<b>998</b>	<b>3,660</b>	<b>565</b>	<b>1,974</b>

<sup>25</sup> Source: Marsden Jacob 2020. Note, the values in the table are expressed in nominal terms.

<sup>26</sup> Greater than 35 microns



**Figure 3. Annual single-use plastic litter avoided (million items), options 1, 1b, 2, and 3<sup>27</sup>**

It is important to note that because options 1 (or 1b) and 2 or options 2 and 3 are potentially complementary options, implementing both options would achieve greater reductions in litter than implementing either option individually. However, the total reduction in litter achieved by implementing the 2 options in combination would be somewhat less than the sum of the litter reductions achieved by the 2 options individually.

<sup>27</sup> Source: Marsden Jacob 2020

## Costs and benefits of options

A cost-benefit analysis has been undertaken of the options, with costs and benefits assessed relative to the base case.

The cost-benefit analysis has been undertaken consistent with *NSW Government Guide to Cost-Benefit Analysis* (NSW Treasury, 2017).

Major features of the cost-benefit analysis are:

- analysis undertaken over 10-year and 20-year timeframes
- use of a central discount rate of 7% real, with sensitivity analysis using discount rates of 3% and 10%
- further sensitivity analysis based on changes to a number of other key variables
- a comprehensive material flows analysis to support the cost-benefit analysis. The material flows analysis details consumption and littering of single-use plastics under the base case and each of the options.

The following sections present summary results for the main analysis and sensitivity analysis and key drivers of the results. Information is also provided on the costs and benefits of each of the options.

The reduced convenience/utility for consumers of non-plastic alternatives was not quantitatively assessed in the cost-benefit analysis because reliable and robust estimates of value could not be obtained, and the impacts are likely to be relatively minor.

## Summary results

### Cost-benefit analysis

The central results of the cost-benefit analysis, based on a 7% discount rate and 20-year analysis period, are presented in Table 9. Option 1 has a net benefit of \$362 million and a benefit-cost ratio (BCR) of 1.26, meaning that its implementation is likely to lead to a net benefit to the NSW community.

Option 1b has a net benefit of \$85.0 million and a BCR of 1.14 over a 20-year analysis timeframe, meaning that its implementation is likely to lead to a net benefit to the NSW community. Most of the net benefits accrue in the second 10 years of the 20-year analysis period.

Option 2 has a net benefit of \$15 million and a BCR of 1.22. The relatively small net benefit of this option reflects the limited benefits of this option in terms of reduced litter, but the option has correspondingly low costs.

Although options 1, 1b and 2 have net benefits over a 20-year analysis timeframe, most net benefits accrue in the second 10 years of the 20-year analysis period (Table 10). This suggests that over a more extended timeframe, net benefits of the options will continue to accrue. This is especially true of Options 1 and 1b.

Option 3 has a net cost of -\$20 million and a BCR of 0.93 over a 20-year analysis timeframe. This result suggests that its implementation is unlikely to lead to a net benefit to the NSW community. Over a 10-year analysis timeframe Option 3 has lower BCR still of 0.86.

The results do not include costs and benefits of phasing-out plastic microbeads and other non-soluble plastic polymers used in personal care products. We note that this exclusion is unlikely to significantly affect the results, with the most likely outcome of quantifying costs and benefits of phasing out plastic microbeads being an improvement to the NPV and BCR.

**Table 9. Summary of results, options 1, 1b, 2 and 3 (20-year analysis period)**

Key measure	Option 1	Option 1b	Option 2	Option 3
Incremental benefits (\$millions NPV)	\$1,780.8	\$708.7	\$83.0	\$248.0
Incremental costs (\$millions NPV)	\$1,418.6	\$623.7	\$68.3	\$267.7
Net benefits (\$millions NPV)	\$362.3	\$85.0	\$14.7	-\$19.7
Benefit cost ratio	1.26	1.14	1.22	0.93

**Table 10. Summary of results, options 1, 1b, 2 and 3 (comparison of 10- and 20-year analysis periods)**

Key measure	Option 1	Option 1b	Option 2	Option 3
10-year net benefits (\$million)	\$71.2	-\$11.8	\$7.2	-\$19.0
20-year net benefits (\$million)	\$362.3	\$85.0	\$14.7	-\$19.7
10-year benefit cost ratio	1.07	0.97	1.16	0.86
20-year benefit cost ratio	1.26	1.14	1.22	0.93

## Key drivers of results

### Option 1 and option 1b

Option 1 is a relatively high-cost, high-benefit option. However, there are reasons why the benefits of this option outweigh the costs:

- The major driver of costs is the cost differential between single-use plastic items and the cost of single-use alternatives. It is notable that individual items that have a low cost-differential between single-use plastics and alternatives (such as low-density polyethylene bags or disposable plates) achieve the highest NPV and BCR values (Table 11).
- Over time, the difference in cost between plastic single-use items and alternatives is expected to decline due to economies of scale. The rate of decline is uncertain, but a relatively conservative schedule would see the cost-differential between single-use plastic items and the alternatives decline by about 50% over 6 years. A more optimistic schedule would result in an even higher NPV and BCR for Option 1 (see Table 12).
- Option 1 achieves a very rapid reduction in plastic litter (Table 8, Figure 3) and the costs associated with that litter. Although alternatives that replace the single-use plastics are still likely to be littered, based on material composition of the alternatives and their anticipated short life in the receiving environment, the impacts of the alternatives are assessed as being only a small fraction of the single-use plastics they are replacing.
- A combination of price impact and an education campaign are expected to reduce overall consumption of single-use items under Option 1. This will reduce costs, as well as reducing overall litter.
- While the clean-up costs of cotton buds are very high, the WTP does not change. This is likely driven by their small size, meaning they are difficult to see and therefore easy to overlook, while also being difficult to remove from the environment.
- The key drivers for Option 1 hold true for Option 1b. However, due to the significant contribution that single use plastic cups and bowls with lids and heavyweight plastic bags make to plastic consumption in NSW, the benefits achieved are of a smaller scale.

**Table 11. Results for Option 1, by plastic item type (excluding government costs)**

Problematic plastic item	10 years NPV (\$m)	10 years BCR	20 years NPV (\$m)	20 years BCR
Lightweight Plastic shopping bag	-\$1.5	0.99	\$28.3	1.18
'Reusable' heavyweight plastic shopping bag	\$35.6	1.56	\$76.7	1.83
Disposable plastic plates, cutlery, etc.	\$85.8	1.14	\$293.5	1.34
Expanded polystyrene food and beverage container	-\$22.3	0.82	-\$19.0	0.90
Plastic straw	-\$21.8	0.61	-\$18.5	0.76
'Single-use' heavyweight boutique plastic bag	\$2.2	1.14	\$7.8	1.35
Oxo-degradable plastics	-\$0.1	0.98	\$1.3	1.15
Single-use plastic cotton buds	\$0.0	1.00	\$0.0	1.00

## Option 2

Option 2, by contrast, is a relatively low-cost but low-benefit option. However, benefits outweigh costs under this option because:

- capital and operating costs associated with this option are kept to a minimum by targeting additional infrastructure in areas where litter rates are high (such as areas with high public visitation)
- even after allowing for sub-optimal implementation of the option (due to high costs limiting servicing of litter bins and traps), the additional infrastructure installed under this option would only need to divert a relatively small percentage of material from being littered (estimated at 4% of material deposited in new bins would otherwise have been littered) to achieve a positive NPV.

## Option 3

Option 3 achieves similar outcomes to Option 1 but at a much smaller scale. Costs are expected to outweigh benefits under this option because:

- to achieve proportionately similar outcomes to Option 1, the same costs associated with replacing single-use plastics with alternatives are incurred. As well, significant additional costs are incurred for program co-ordination and facilitation
- although Phase 2 of the program would generate additional benefits (the value of compost and avoided landfill), these benefits only slightly outweigh the additional costs of composting.

## Sensitivity analysis

Sensitivity analysis of changes to key variables was undertaken. Benefit-cost ratios resulting from the sensitivity analysis are presented in Table 12. The key variables tested are:

- discount rate
- value of willingness to pay (WTP) to avoid litter
- use of avoided litter clean-up costs to value avoided litter instead of WTP
- price reduction for alternatives to single-use plastic items over time
- reduction in the per-capita consumption of single-use items over time.

Results of the sensitivity analysis indicate that, under all sensitivity tests, Option 1 maintains a positive NPV and BCR greater than 1. Similarly, Option 2 maintains a BCR of greater than 1 under most scenarios. Option 3 maintains a BCR of less than 1 under most scenarios.

Under all but one of the sensitivity tests, Option 1b maintains a positive NPV and BCR greater than 1 over a 20-year analysis period. However, the results for Option 1 are superior for all sensitivity tests.

**Table 12. Sensitivity analysis – benefit-cost ratios (20-year analysis period)**

Benefit-cost ratio	Option 1	Option 1b	Option 2	Option 3
Central case	1.26	1.14	1.22	0.93
Discount rate (3%)	1.33	1.20	1.29	0.94
Discount rate (10%)	1.21	1.09	1.16	0.91
WTP to avoid litter (Low)	1.16	1.08	0.68	0.86
WTP to avoid litter (High)	1.43	1.25	2.21	1.05
Avoided clean-up costs of litter	1.22	1.40	1.10	0.91
Unit cost reduction of alternatives (Schedule 4 – optimistic)	1.48	1.40	na	0.93
Unit cost reduction of alternatives (Schedule 3 – pessimistic)	1.13	1.00	na	0.93
Reduction in the per-capita consumption of single-use items over time (optimistic schedule)	1.47	1.28	na	1.03
Reduction in the per-capita consumption of single-use items over time (pessimistic schedule)	1.06	1.00	na	0.88

## Distributional impacts

The distribution of impacts on retailers/consumers, community, and government are shown in Table 13.

For Options 1, 1b and 3, most of the costs (single-use alternatives) and avoided costs (avoided single-use plastics and avoided consumption) accrue to retailers/consumers, where this impact is driven by the unit costs of the plastic items no longer supplied and the replacement items. Whether the costs ultimately fall on retailers or on consumers will depend on the extent to which costs and avoided costs are passed on from retailers to consumers. For Option 3, costs associated with implementing and co-ordinating the program are assumed to fall on state government.

For Option 2, all the benefits accrue to the community because of avoided litter impacts, while all of the costs accrue to government (state government and local councils). Capital costs of public bins and litter traps and additional education campaigns are expected to cost the state government \$27.2 million (39.8%), and servicing of public bins and litter traps is expected to cost local councils and other agencies \$41.1 million (60.2%).<sup>28</sup>

**Table 13. Distribution of benefits and costs (\$m) (20-year analysis period)**

Key measure	Option 1	Option 1b	Option 2	Option 3
Benefits	\$1,780.8	\$708.7	\$83.0	\$248.0
Retailers/Consumers	\$1,484.5	\$623.2	\$0.0	\$207.8
Community	\$296.4	\$85.5	\$83.0	\$40.1
Government	\$0.0	\$0.0	\$0.0	\$0.1
Costs	\$1,418.6	\$623.7	\$68.3	\$267.7

<sup>28</sup> This breakdown of costs is based on typical cost sharing arrangements between state government and local councils, where the state government provides infrastructure and local councils are responsible for servicing the infrastructure.

Key measure	Option 1	Option 1b	Option 2	Option 3
Retailers/Consumers	\$1,410.4	\$615.7	\$0.0	\$253.7
Community	\$0.33	\$0.1	\$0.0	\$0.05
Government (and Industry-Option 1b)	\$7.9	\$7.9	\$68.3	\$14.0

## Option 1 benefits and costs

Table 14 provides details of benefits and costs for Option 1.

### Benefits

#### Avoided cost of problematic plastic items

The most significant benefit is the avoided cost of prohibited plastic items, which are no longer supplied due to being prohibited. This also applies to the voluntary phase out of heavyweight plastic bags.

#### Avoided litter costs

Because these items are phased out, prohibited plastic items are no longer littered. Although, alternatives that replace the prohibited items are still likely to be littered. Based on material composition of the alternatives and their anticipated short life in the receiving environment, the impacts of the alternatives are assessed to be only a small fraction of the single-use plastics they are replacing<sup>29</sup>. So, there is a substantial avoided litter cost incremental to the base case.

**Table 14. Option 1 benefits and costs (\$m)**

Impacted party	10 years \$ million (NPV)	20 years \$ million (NPV)
<b>Total benefits</b>	<b>\$1,052.2</b>	<b>\$1,780.8</b>
Benefits to <b>retailers/consumers</b> from avoided material cost – plastic products	\$877.2	\$1,484.5
Benefits to <b>community</b> from avoided plastic litter cost	\$174.9	\$296.4
Benefits to <b>government</b> - N/A	\$0.0	\$0.0
<b>Total costs</b>	<b>\$981.0</b>	<b>\$1,418.6</b>
Costs to <b>retailers/consumers</b> for additional material – alternative products	\$974.1	\$1,410.4
Costs to <b>community</b> for additional non-plastic litter	\$0.2	\$0.3
Costs to <b>government</b> for education campaign	\$4.4	\$4.4
Costs to <b>government</b> for regulation and compliance	\$2.3	\$3.5

### Costs

#### Cost of alternatives

The main cost is the additional cost of alternatives to problematic plastic items. The unit costs of these alternatives are currently 2 to 4 times that of the corresponding plastic item. However, these costs are expected to decrease over time due to economies of scale as consumption becomes

<sup>29</sup> The lifespans of single-use plastics in the environment range from 50 years to greater than 500 years. Some plastics essentially never break down. The lifespans of biodegradable alternatives in the environment range from one month to 2 years. Based on these respective lifespans, the impacts of littered alternatives on receiving environments and on amenity are estimated to be only a small fraction of the impacts of littered single-use plastics.

more widespread. Further, the extensive education campaign included in this option is expected to decrease the consumption of all relevant problematic plastic items over time, which will lessen the impact associated with the higher unit costs of alternatives. The rate of decrease will slow over time, however.

### Administration and enforcement costs

For Options 1 and 1b, additional administration and enforcement efforts are estimated to require 2.5 full-time equivalent (FTE) staff on an ongoing basis. This will involve:

- 0.5 FTE at the manager level costing \$75,000 per year including on-costs
- 2 FTE compliance/operational officers each costing \$115,000 per year including on-costs.

### Compliance costs

The compliance costs for this option, which fall on retailers/consumers, comprise the net cost of switching from supplying/using single-use plastic items to supplying items made from alternative materials. As detailed in Table 14, the difference in cost is estimated to be \$74 million (NPV) over the 20-year analysis period. The extent to which this falls to consumers rather than retailers depends on the extent to which these costs are passed from retailers to consumers. A review of the price of alternatives may be considered to reduce the risk of price gouging.

### Education campaign costs

The phase out of single-use plastics is to be accompanied by an extensive education campaign encompassing channels such as social media, television advertising, letters, and community meetings. This education campaign will cost \$1 million per year for the first 5 years of the phase out or \$4.4 million NPV.

## Option 1b benefits and costs

Table 15 provides details of benefits and costs for Option 1b over 10-year and 20-year analysis periods.

**Table 15. Option 1b benefits and costs**

Impacted party	10 years \$ million (NPV)	20 years \$ million (NPV)
<b>Total benefits</b>	<b>\$418.9</b>	<b>\$708.7</b>
Benefits to <b>retailers/consumers</b> from avoided material cost – plastic products	\$368.4	\$623.2
Benefits to the <b>community</b> from avoided plastic litter cost	\$50.5	\$85.5
Benefits to <b>government</b> N/A	\$0.0	\$0.0
<b>Total costs</b>	<b>\$430.8</b>	<b>\$623.7</b>
Costs to <b>retailers/consumers</b> for additional materials – alternative products	\$424.0	\$615.7
Costs to <b>community</b> for additional non-plastic litter cost	\$0.1	\$0.1
Cost to <b>government/industry</b> for education campaign	\$4.4	\$4.4
Cost to <b>government/industry</b> for regulation and compliance	\$2.3	\$3.5

Further results for Option 1b split by individual single-use plastic item are provided in Table 16.

**Table 16. Results for Option 1b, by plastic item type (excluding government costs)**

Problematic plastic item	10 years NPV (\$m)	10 years BCR	20 years NPV (\$m)	20 years BCR
Lightweight plastic shopping bags	-\$1.5	0.99	\$28.3	1.18
'Reusable' heavyweight plastic shopping bags	\$28.5	1.56	\$61.4	1.83
Disposable plastic cutlery, etc.	\$10.2	1.15	\$34.5	1.34
Expanded polystyrene food and beverage containers	-\$22.3	0.82	-\$19.0	0.90
Plastic straws	-\$21.8	0.61	-\$18.5	0.76
'Single-use' heavyweight boutique plastic bags	\$1.8	1.14	\$6.2	1.35
Single-use plastic cotton buds	\$0.0014	1.00	\$0.0034	1.00

## Litter impacts

For comparison, the litter impacts of Option 1b are compared to the impacts of Options 1, 2 and 3. These are shown in Figure 3.

Option 1b is a variant of Option 1. For Option 1b, plastic cups and bowls with lids are excluded from the phase out of problematic plastics and heavyweight plastic bags are subject to a voluntary, industry led phase out and a design standard for oxo-degradable plastics is not set. Due to the reduced scope of Option 1b, it necessarily achieves a significantly smaller reduction in litter than Option 1. However, Option 1b still achieves a larger reduction in litter than Options 2 and 3.

## Costs and benefits of phasing out plastic microbeads

As previously noted, results of the analysis do not include costs and benefits of phasing out plastic microbeads and other non-soluble plastic polymers used in personal care products. Following is a brief discussion of the potential costs and benefits of phasing out plastic microbeads under options 1 and 1b.

The discussion indicates that exclusion of plastic microbeads from the quantitative analysis is unlikely to significantly affect analysis results. Costs relative to the base case are likely to be negligible. As with other microplastics, it is not possible to value the benefits of reducing plastic microbeads entering the environment (see the section 'Plastic microbeads in personal care products' on page 11). However, considering WTP and avoided clean-up cost estimates provided for larger plastic fragments, the benefits of phasing out plastic microbeads are very likely to outweigh the costs.

As detailed previously, it is not feasible to accurately quantify current consumption of microbeads contained in personal care products or the littering/pollution associated with that consumption. Survey data compiled by Envisage Works (2018, 2020) indicates that approximately 0.7% to 6% of these products sold in Australia contain microbeads or other non-soluble plastic polymers. The lower percentage relates to rinse-off products only and may also reflect, to some extent, effects of the voluntary phase-out of plastic microbeads found in rinse-off products sold in Australia that was initiated by the industry association accord in 2016, under supervision of the Australian Department of Agriculture, Water and Environment and NSW EPA.

The effectiveness of voluntary phase out may not be as significant as the percentage differences between the 2 surveys might suggest. Scrutiny of the survey data indicates the number of rinse-off products supplied by accord members that contain plastic microbeads only fell from 21 to 18

between 2017 and 2020<sup>30</sup>. Nevertheless, the numbers of products overall that will be affected by a ban in NSW of plastic microbeads in personal care products appears to be quite small – at most, a few hundred out of many thousands of relevant products currently on the market.

The 2020 survey indicated that there were no plastic microbeads present in cleaning products or in oral hygiene products, such as mouthwash and toothpaste. Nearly all the products containing plastic microbeads are skin cleaners and facial scrubs. Plastic microbeads in these products are used primarily as skin exfoliants. Exfoliants made from alternative materials are readily available. Alternatives include salt, sugar, coffee, ground oats and dairy. Evidence suggests that the use of these alternatives adds little or no extra cost to the cosmetic products, with available information indicating that the main reason plastic microbeads are used is that they are perceived as not being as harsh on skin as microbeads made from other materials – or at least are marketed as such.

Skin cleaners and facial scrubs using non-plastic microbeads are now frequently sold in Australia and are a requirement in the USA and the UK, where plastic microbeads are banned from rinse-off personal care products. In the EU, plastic microbeads are soon to be banned from all cosmetics and a range of other products.<sup>31</sup>

## Option 2 benefits and costs

Table 17 provides details of benefits and costs for Option 2. Results for individual plastic items are not available for Option 2.

### Benefits

#### Avoided litter

The main benefit of Option 2 is the avoided litter cost associated with additional waste being disposed in public bins (not littered) or littered and captured in litter traps. As with Option 1, 2 alternative methods have been applied to assess the value of avoided litter – WTP to avoid litter and avoided litter clean-up costs. The WTP method generates an avoided litter cost estimate of \$83 million (NPV) over a 20-year analysis period. The avoided clean-up cost method generates an estimate of \$75 million (NPV).

### Costs

#### Capital and operating costs, bins and litter traps

The main costs are associated with the capital and operating costs of additional public bins. These costs are substantially greater than the capital and operating costs of litter traps because Option 2 includes the installation of many more additional bins than additional litter traps.

Option 2 assumes the purchase and installation of 6,000 additional public litter bins (\$2,500 each) and 250 additional litter traps (\$10,000 each). Public bins are replaced every 10 years, while litter traps are replaced every 15 years.

Operating costs depend on the frequency with which bins and traps are serviced. For the central case, servicing is assumed to occur only 50% of the time when the bins and traps become full. This has implications for the efficacy of the bins and traps. A servicing frequency of 100% of those times was applied as a sensitivity case.

<sup>30</sup> Accord has advised that a number of these products are discontinued product lines or unauthorised parallel imports ([www.environment.gov.au/protection/waste/plastics-and-packaging/plastic-microbeads](http://www.environment.gov.au/protection/waste/plastics-and-packaging/plastic-microbeads)).

<sup>31</sup> In the USA, the *Microbead-Free Waters Act of 2015* prohibits the manufacturing, packaging, and distribution of rinse-off cosmetics containing plastic microbeads ([www.fda.gov/cosmetics/cosmetics-laws-regulations/microbead-free-waters-act-fags](http://www.fda.gov/cosmetics/cosmetics-laws-regulations/microbead-free-waters-act-fags)). The Environmental Protection (Microbeads) (England) Regulations 2017 bans the manufacture and sale of rinse-off personal care products containing microbeads in the UK ([www.legislation.gov.uk/ukdsi/2017/9780111162118/pdfs/ukdsiem\\_9780111162118\\_en.pdf](http://www.legislation.gov.uk/ukdsi/2017/9780111162118/pdfs/ukdsiem_9780111162118_en.pdf) (PDF 49 KB)). The EU ban on plastic microbeads in cosmetics as well as a range of other products will come into effect in 2022.

## Administration and enforcement costs

Under Option 2, administration and enforcement costs will be unchanged incremental to the base case.

## Compliance costs

Under Option 2, compliance costs will be unchanged incremental to the base case.

## Other costs

The installation of additional litter collection and clean-up infrastructure will be supported by a statewide education campaign. This education campaign will be similar in size and scope to the 'Don't Be A Tosser' campaign undertaken in 2019–20. This education campaign will cost \$1 million per year for the first 3 years of the program.

**Table 17. Option 2 benefits and costs (\$m)**

Impacted party	10 years \$ million (NPV)	20 years \$ million (NPV)
<b>Total benefits</b>	<b>\$52.4</b>	<b>\$83.0</b>
Benefits to <b>retailers/consumers</b> – N/A	\$0.0	\$0.0
Benefits to <b>community</b> from avoided litter cost – all material types (single-use plastic items and all other items, both plastic and non-plastic) <sup>32</sup>	\$52.4	\$83.0
Benefits to <b>government</b> – N/A	\$0.0	\$0.0
<b>Total costs</b>	<b>\$45.1</b>	<b>\$68.3</b>
Costs to <b>retailers/consumers</b> – N/A	\$0.0	\$0.0
Costs to <b>community</b> – N/A	\$0.0	\$0.0
Costs to <b>government</b> for education campaign	\$2.8	\$2.8
Costs to <b>government</b> for public bins – capital cost	\$14.0	\$21.2
Costs to <b>government</b> for public bins – ongoing cost	\$25.7	\$40.7
Costs to <b>government</b> for litter traps – capital cost	\$2.3	\$3.2
Costs to <b>government</b> for litter traps – ongoing cost	\$0.3	\$0.4

## Option 3 benefits and costs

Table 18 provides details of benefits and costs for Option 3.

### Benefits

#### Avoided cost of single-use plastic items

The main benefit of Option 3 is the avoided cost of single-use plastic items, which are supplied to fewer businesses in participating precincts due to being partially phased out. Because they are supplied in lower quantities in participating precincts, fewer single-use plastic items are littered in these precincts, so there is an avoided litter cost incremental to the base case.

<sup>32</sup> Unlike Options 1 and 3, Option 2 does not exclusively target single-use plastic items.

Table 18. Option 3 benefits and costs (\$m)

Impacted party	10 years \$ million (NPV)	20 years \$ million (NPV)
<b>Total benefits</b>	<b>\$120.4</b>	<b>\$248.0</b>
Benefits to <b>retailers/consumers</b> from avoided material cost – plastic products	\$100.8	\$207.8
Benefits to <b>community</b> from avoided plastic litter cost	\$19.5	\$40.1
Benefits to <b>government</b> from avoided garbage collection costs	\$0.03	\$0.06
Benefits to <b>government</b> margin returns from compost	\$0.01	\$0.03
<b>Total costs</b>	<b>\$139.4</b>	<b>\$267.7</b>
Costs to <b>retailers/consumers</b> for additional material – alternative products	\$127.2	\$253.7
Costs to <b>community</b> from additional non-plastic litter	\$0.01	\$0.03
Costs to <b>government</b> for setup	\$0.4	\$0.4
Costs to <b>government</b> for additional staff for facilitation, coordination, administration	\$11.6	\$13.5
Costs to <b>government</b> for compostable item disposal bins	\$0.04	\$0.04
Costs to <b>government</b> for compostable item collection	\$0.03	\$0.07

## Costs

### Cost of alternatives to single-use plastic items

The main cost of Option 3 is the additional cost of alternatives to single-use plastic items. As with Option 1, the unit costs of these alternatives are currently 2 to 4 times that of the corresponding plastic items. As with Option 1, these costs are expected to decrease over time due to economies of scale as consumption becomes more widespread. However, the rate of decrease in costs will not be as great as under Option 1 due to the slower and less widespread uptake of alternatives.

### Staff costs

Another cost for this option is associated with additional staff for facilitation, coordination, and administration of the program.

### Administration costs

For this option, administration and related costs have been modelled to include:

- setup costs – in 3 waves of 10 participating precincts in each wave at a cost of \$150,000 per set of 10 precincts, with these costs incurred in Years 1, 4, and 7 of the program
- one local facilitator per precinct, working full time for 3 years, then one day per week for the next 3 years; each year costing \$115,000 per FTE including on-costs
- one administrator per 10 precincts for each of the 3 waves (Years 1 to 3, 4 to 6, and 7 to 9); each costing \$95,000 per year including on-costs
- one co-ordinator per 10 precincts on a permanent ongoing basis; each costing \$150,000 per year including on-costs.

### Compliance costs

Under Option 3, compliance costs will be unchanged compared to the base case.

## Other costs

Other costs include:

- the provision of bins for the disposal of compostable items provided to businesses in participating precincts costing \$20,000 per 10 precincts, in Years 4, 7, and 10
- a collection service for compostable items costing \$80 per tonne of waste collected.

## Competition impacts

With consideration to the requirements of the Competitions Principles Agreement, the competition impacts of the proposed policies are as follows.

With Option 1 (and 1b), there are likely to be minor competition impacts because of regulation concerning the phase out of single-use plastic items. Potential competition impacts may relate to restricting the type of goods available to consumers or the type of goods available to a retailer to offer for sale and potentially conferring any compliance costs on to businesses. These impacts are likely to be most significant in border communities, where similar regulations may not exist for businesses operating across the border.

With Option 2, there are no competition impacts because this option only targets litter reduction through the installation of additional public bins and litter traps. Any participation (use of bins and traps) by individuals and businesses is voluntary.

With Option 3, potentially there are minor competition impacts if businesses in participating precincts are perceived as better corporate citizens and increase their patronage and market share. Businesses that participate in the first round (years 1 to 3) would, potentially, be placed at a minor advantage to businesses in precincts that are selected to participate in the second (years 4 to 6) or third (Years 7 to 9) rounds, or not at all.

Large-scale litter avoidance in NSW and its associated net benefit can only be achieved by regulation that could (unintentionally) result in restricting competition – that is Option 1 and 1b.

## Uncertainties and gaps

The cost-benefit analysis undertaken to support the BRS is subject to uncertainties and gaps.

**Value of avoided litter (all options):** Because the natural system, amenity and other impacts associated with litter are not valued in the market, there are inevitably uncertainties with derived estimates. The use of 2 alternative methods for valuing avoided litter that generate similar estimates provides some confidence that the estimated values are reasonable – more so because they are broadly consistent with an estimate derived from an international study (UNEP 2014). Shortcomings with the methods used indicate that the avoided litter values used in the cost-benefit analysis are more likely to understate than overstate the value of avoided litter.

**Costs of alternatives to single-use plastic items (options 1 and 3):** There are uncertainties about the costs of alternatives to single-use plastic items and especially how the costs will change over time. The use of multiple sources for costs of alternatives provides confidence that the initial estimates are robust. The use of multiple scenarios in sensitivity analysis to test the impact of changes in costs over time also provides confidence that these uncertain cost pathways are accounted for in the analysis.

**Loss of producer surplus (options 1 and 3):** Loss of producer surplus for suppliers of single-use plastic items has not been assessed. Noting that the single-use plastic items will be substantially replaced by single-use alternatives, the net loss of producer surplus is likely to be negligible.

**Loss of consumer surplus (Options 1 and 3):** The price impact of replacing problematic plastic items with alternatives on the consumption of associated goods (take-away food and beverages, clothing, other consumables) and associated consumer surplus has not been estimated. Given estimated price impacts, loss of consumer surplus is likely to be negligible.

The cost of additional bin liner bags has not been assessed. However, we do not anticipate that any additional cost will be material to results of the analysis.

## Preferred option (option 1b)

The plan looks to the future of how plastic will be used in NSW. A plan underpinned by strong regulatory boundaries helps to provide clarity to industry and consumers regarding appropriate and acceptable design, use and recovery of plastic products. With this goal in mind, it is essential to future-proof the policy positions to allow the NSW Government to respond to issues as they arise.

Consideration of this objective and the costs and benefits outlined above lead to the following preferred option.

### Reducing the impact of problematic plastics

The preferred option to reduce the impacts of problematic plastic items is to prohibit the supply of certain plastic items and items (such as rinse off personal care products that contain plastic microbeads) that do not conform to a prescribed design standard. Both phase-out of specific items and mandatory design standards will operate in a complementary manner, with the same compliance regime and penalties.

The NSW Government will prohibit key problematic plastics including:

- lightweight shopping bags (35 microns or less)
- single-use plastic straws, cutlery and stirrers
- single-use plastic plates and bowls (excluding bowls with spill proof lids)
- expanded polystyrene (EPS) foodservice items
- single-use plastic cotton buds.

The NSW Government will also introduce a design standard to prohibit the supply of rinse off personal care products containing plastic microbeads.

The legislation giving effect to the bans will also provide the power for the regulations to:

- prescribe other problematic or unnecessary plastic items as prohibited plastic items
- set design standards for how items or packaging are designed, what materials or additives they must or must not be composed of or combined with, and any labelling that must be displayed.

Design standards will seek to improve or reduce barriers to recyclability, reduce litter potential and promote waste avoidance. Items may only be supplied where they comply with any prescribed design standards.

Manufacturers, distributors and retailers will be obliged to ensure that any products they supply are compliant with the prescribed requirements and do not provide false and misleading information about any prescribed product or requirement.

The prohibition is intended to capture all forms of supply, sale or distribution, including providing for free, use at charitable or community events as well as retailers, manufacturers and distributors of the prescribed item.

The regulations will have the power to:

- apply a design standard or prohibition across an entire product range (e.g., all plastic packaging)
- apply a design standard or prohibition to a specific material type (e.g., PET)
- exempt or include specific applications (e.g., exempt medical packaging or prohibit PVC labelling)
- exempt or include certain people or groups of people (e.g., people with a disability or specific retailer types)

## Other problematic plastic items

Despite the significant BCR and high NPV achieved from phasing out heavyweight plastic shopping bags (greater than 35 microns)<sup>33</sup>, these items will not be phased out in the first tranche. The National Retail Association has indicated they will roll out a national voluntary phase out of heavyweight plastic bags by 2023. The NSW Government will monitor industry progress against this target and will make the phase out of heavyweight plastic bags mandatory in a second tranche of phase outs if the target is not achieved. Option 1b includes assessment of the comparative benefits and costs of this voluntary approach, as opposed to the regulatory approach assessed under Option 1.

While the cost-benefit analysis indicates strong support for phase out of plastic cups and bowls with lids, a lack of affordable, suitable and accessible alternatives currently on the market means that these items will not be phased out at this time. The NSW Government will monitor the market for the emergence of suitable alternatives and may phase out these items when such an alternative exists.

It is not intended to prohibit the supply of problematic plastic items that are sold as part of ready-to-consume pre-packaged food or drink items where those items are integrated as part of a machine-automated process, such as straws that are attached to a juice box or a spoon that is attached to a yogurt container via such a process.

An exemption will be made to allow the supply of single-use plastic straws to people with a disability or other medical condition who require a straw for consumption of beverages.

Increasing evidence suggests that 'compostable' or 'biodegradable' plastics present a comparable risk to the environment to conventional petroleum-based plastic when littered. Therefore, alternative problematic plastic products made from such materials will also be prohibited.

While the use of oxo-degradable plastics will not be prohibited at this time, they will be further reviewed for phase out in 2024, as committed to in the plan.

## Future design standards for problematic products

The legislation includes the power to prescribe future design standards, including to:

- address how a product or packaging is designed
- specify what materials or additives it must or must not be composed of or combined with
- require clear labelling on products or packaging to inform the consumer how to safely and effectively dispose or recycle the packaging.

Design standards may be prescribed for environmental, human health or economic reasons, including to reduce the impact of an item on the environment, improve the recyclability of an item, improve re-use of recycled material or provide a consumer with information about the item (regarding materials or disposal).

The regulations will provide the flexibility to limit the design standard to specific people, products or materials and the legislation will enable exemptions where required (such as for people with specific needs).

Other design standards may also be considered in the future and may be investigated by the department. Examples of possible design standards for further investigation include:

- mandated recycled content in plastic packaging
- ensuring all packaging is recyclable, reusable or compostable
- mandated labelling requirements, either for recycled content or disposal information, or both

<sup>33</sup> This includes the 'reusable' heavyweight plastic bags available at supermarkets for a small fee and the single-use heavyweight bags provided by department stores or boutique retailers. It does not include 'green' non-woven reusable bags.

- tethering bottle caps to plastic beverage containers
- prohibiting the use of certain colour additives to PET, high-density polyethylene or polypropylene plastic packaging (such as carbon black and bright green)
- prohibiting the use of mixed material packaging (for example, paper and plastic such as liquid paperboard, or mixed plastics such as PVC labels) and problematic plastics (such as polystyrene and PVC).

In applying design standards beyond the use of microbeads in personal care products, the merits of proposed standards to alleviate specific market failures or risk of environmental harm will be investigated thoroughly. Any proposed new design standard would, at a minimum, need to comply with the requirements of the *NSW Subordinate Legislation Act 1989*.

### Preferred option achieves net benefits for NSW

The preferred option realises a net benefit across the range of impacted items. While some items, such as EPS food service items and straws come at a net cost over 20 years, phasing these items out as part of the broader package acts to offset these costs to deliver a net benefit to NSW.

Failure to act on these items means the government would not achieve its public commitment and primary objective of mitigating the environmental impact of single-use and problematic plastics nor its ambitious litter reduction targets. The preferred option had enormous community support during the consultation and in ongoing correspondence to the department. In addition, failure to act on highly littered plastics means NSW falls further behind other jurisdictions and countries.

It is advantageous to announce and pursue the phase outs and design standards prohibiting plastic microbeads in personal care products plastics as a single package of interventions, with staggered implementation to allow sufficient transition for different products types. The reforms will be accompanied by consumer and business education campaigns to ensure awareness and improve effectiveness of the intervention. As multiple items are phased out simultaneously, many of the costs can be shared between items. This reduces the relative cost burden on each item being regulated. This approach maximises efficiency in operating costs and minimises business and community uncertainty and disruption.

# Consultation

## Consultation process

Development and assessment of options to reduce the impacts of problematic plastics is supported by 3 levels of consultation.

### Discussion paper

In March 2020 the department released a discussion paper for public comment on directions for the plan. The discussion paper sought community and stakeholder feedback on initiatives being proposed for the plan.

The discussion paper was available in both a short overview and a longer, more detailed paper. This allowed all sections of the community to access the information. Submissions could be provided directly to the department by email, or respondents could complete an online survey. The survey was available as a short 10-question survey or a longer 40-question survey with both closed and open responses. Questions were designed to elicit responses relevant to the questions asked in the discussion paper.

Over 16,000 submissions were received in response to the discussion paper, with the majority of these received from community through the online surveys. A total of 69 key stakeholders, such as retailers, manufacturers, local government, the waste industry and environmental groups, submitted detailed responses by email. 'Appendix 1 – Stakeholders who provided written submissions' provides a list of all key stakeholders who provided a written feedback.

A consultation outcomes report (Department of Planning, Industry and Environment, 2021) provides a detailed analysis of the feedback received in response to the consultation. The report outlines the views of the community and key stakeholders based on each priority direction detailed in the discussion paper.

### Survey

In June 2020, IPSOS conducted a knowledge, attitude and behaviour study at the department's request (IPSOS 2020). The purpose of the survey was to establish baseline data of key knowledge, attitudes, and behaviours of NSW residents in relation to the use of single-use plastics and their alternatives.

This study considered the attitudes of a broad range of NSW residents, including those that may otherwise not have engaged with the discussion paper. The study was conducted during the peak of the COVID-19 pandemic and specifically addressed any potential shifts in attitudes to single-use items as a result of the pandemic.

The survey's target audience was the broad NSW population over 18 years of age. The sample size was 312 people approximately equally weighted across different age groups, income levels, education levels and genders. Approximately 83% of respondents were from households where English is the only language spoken.

### Targeted consultations

Targeted consultations with key stakeholder organisations were also undertaken.

The department met with representatives from key environmental groups, the manufacturing and retail industry, peak bodies, local council organisations and disability advocacy organisations. 'Appendix 2 – Targeted stakeholder consultation' provides a list of stakeholders who engaged in targeted consultation.

Consultations were also undertaken as part of the cost-benefit analysis process. Questionnaires were sent to 25 organisations including plastics suppliers, peak retail and food and grocery

organisations, major takeaway food chains, non-government environment organisations and non-government disability organisations. Follow-up discussions were held with 12 organisations.

## Key themes

Some key themes emerged from these consultations. Most of the feedback focussed on issues relevant to options 1 and 1b.

### Support for banning problematic and single-use plastics

There is generally strong support for the phase out of problematic and single-use plastics from key stakeholder groups, as well as from the broader community.

Retailers and manufacturers and their peak bodies support the ban of these items subject to adequate lead time to ensure existing stock could be used. These groups note the strong public push towards more environmentally friendly alternatives, and many have already begun to transition away from the problematic items. Several stakeholders also suggested exemptions for some items (see below).

Community responses to the discussion paper indicated extremely strong support for the phase out of single-use plastics, averaging 98% support across all categories. Support for a design standard to ban oxo-degradable plastics was also extremely high, at 98%, while support for mandatory design standards more generally remained very high, at 86%.

Support in the broader NSW community, as surveyed by IPSOS, was also consistently high, being greater than 60% support for nearly all items including polystyrene cups or packaging, single-use food and beverage containers, bowls, plates and cutlery, straws and lightweight plastic bags (with less than 25% opposed to the bans in all cases and the remainder neutral). Support for phasing out heavyweight plastic bags was slightly less at 55% (27% opposed). Support is slightly reduced (by between 1% and 7% points for each item) when a small additional cost of between 5c and 50c is imposed for alternative items.

### Phase out timeframes

Key stakeholder groups involved in the supply and retail use of the effected items were generally supportive of the bans of oxo-degradable and problematic plastics items but stressed the need to ensure a phase out period that would not adversely affect existing contracts or disrupt supply chains. A phase out timeframe of 2 to 3 years was typically suggested.

### Exceptions

Several stakeholder groups also expressed concern about the social impact of phasing out the supply and use of plastic straws and boutique bags. Use of straws is essential for some people with a disability or other medical need and the alternatives (paper, bamboo, wood, metal) are either not fit-for-purpose or very expensive or both. Non-government disability support organisations and some retail organisations suggested that plastic straws be exempt from a phase out of single-use plastics.

Some retail organisations also expressed concern about the phase out of heavyweight boutique style plastic bags due to cost and a lack of feasible alternatives at present. They also noted that peak bodies, such as the National Retailers Association, are undertaking campaigns to encourage voluntary reductions in use of these items.

### Cost of alternatives

There was general agreement among relevant stakeholder organisations that while the cost of single-use alternatives to plastics (such as bamboo, cardboard, paper and wood) can be higher than single-use plastics, costs for many items can be expected to fall over time with the wholesale adoption of the alternatives.

## Costs of servicing bins and litter traps

Some stakeholder organisations, including local councils, expressed scepticism about Option 2, noting that a key barrier to implementing more widespread adoption of litter bins and litter traps is not so much the capital costs of litter infrastructure but the cost of servicing and maintaining the infrastructure.

## How concerns were addressed through options

Noting some of the concerns outlined above, a number of features are proposed for Option 1 as recommended:

- exemptions should apply for people with a disability to access straws
- other exemptions for certain settings, such as healthcare, prisons and airlines should be investigated
- the phase out of heavyweight, boutique style plastic bags should be delayed to allow for monitoring of the voluntary industry progress in reducing consumption of these items.

With respect to Option 2, a feasible solution could not be found for addressing the issue of servicing costs. If Option 2 is implemented, its effectiveness will be limited by the ability and willingness of organisations involved in the management of public litter (such as local councils) to provide ongoing servicing of litter infrastructure. This limitation is reflected in analysis of the option.

# Evaluation and review

## Regulation-making process

The legislative frameworks established under these reforms allow NSW to prohibit certain problematic or unnecessary plastic items and set design standards for items for environmental, human health or economic reasons.

Initial items for prohibition will be included in the parent Act, with the power for the regulations to prohibit other plastic items or set design standards.

The first tranche of problematic plastic items to be banned for supply include:

- lightweight plastic shopping bags
- single-use plastic stirrers
- single-use plastic straws
- single-use plastic cutlery
- single-use plastic plates
- single-use plastic bowls (excluding bowls with spill proof lids)
- expanded polystyrene food service items
- single-use plastic cotton buds.

Design standards will prohibit the supply of plastic microbeads in rinse off personal care products.

The plan commits to reviewing other items in 3 years for possible prohibition through the regulations. This includes:

- single-use plastic cups and bowls with lids (including the lids)
- barrier bags
- heavyweight plastic bags
- non-compostable fruit stickers
- oxo-degradable plastics.

Regulations may also be made for other products not addressed in this BRS. Any further regulations will be established based on evidence in support of the proposed intervention and the need for action to prevent harm. This may include evidence of environmental or market harm.

These regulations will be subject to the standard regulation-making process, as required by the NSW *Subordinate Legislation Act 1989*. Regulations will be developed in consultation with impacted stakeholders. Any proposal to prescribe a new prohibited plastic item or design standard will be available for comment for at least 8 weeks, except in limited circumstances.

## Regulatory review process

Under the Subordinate Legislation Act, regulations are scheduled for automatic repeal after 5 years. This ensures that each regulation remains relevant and fit for purpose. Regulations that are due for repeal can be remade (either with or without amendments), postponed or allowed to lapse.

Further to this, the Act will be reviewed as soon as possible after 5 years from its assent.

Timing of legislative reviews aligns with the timeframe for the department to evaluate and review the success of the interventions against the 2025 targets. The department will continue to liaise with industry and other key stakeholders about the effectiveness and operation of the new requirements. The information gained through continued stakeholder consultation and review of the regulation will inform future changes to the regulatory framework. Pending the outcome of the

review, the regulation may be remade with or without amendments, or repealed. This process to evaluate the effectiveness of the regulation is critical to ensure an effective and balanced regulatory regime.

## Evaluation of actions against the targets

The NSW Government will monitor and evaluate the effectiveness of actions outlined in the plan through the state outcome indicator 'Percentage reduction in the consumption of problem single-use plastics'. This indicator will measure the reduction in plastic consumption in NSW over time and will be used to track progress of plastic management initiatives in NSW.

Phase outs and design standards implemented through the proposed regulations will be the major NSW Government action contributing to achieving the state outcome and will directly influence 3 of the 4 targets outlined in the discussion paper.

### Target: Phase out key single-use and problematic plastics

The indicator will serve the function of monitoring the ban of problematic plastics such as single-use plastics.

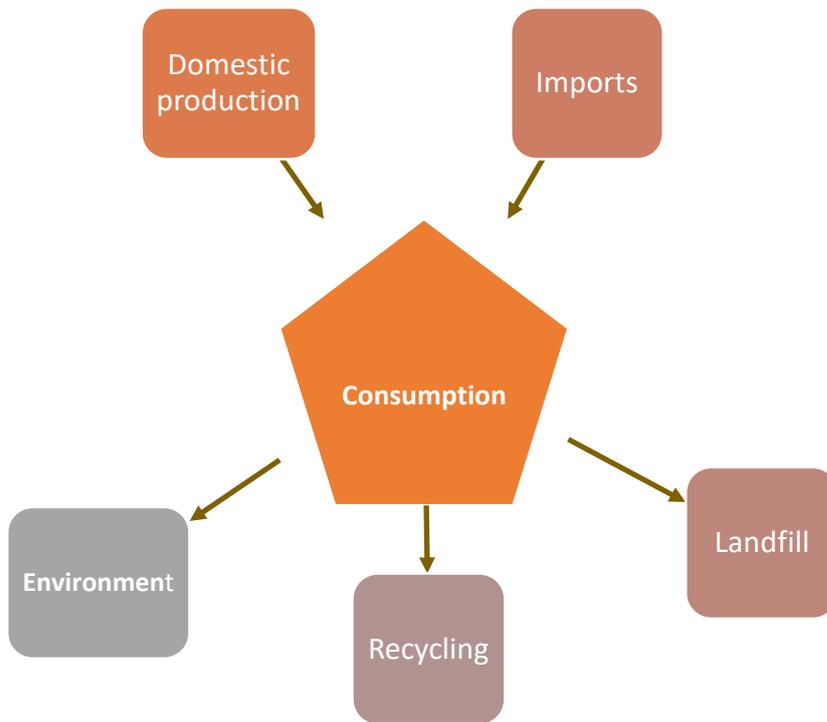
There is no single, comprehensive data source to accurately measure consumption of problematic plastics in NSW. Accordingly, a weight-of-evidence approach is adopted that draws on benchmarks from range of data sources, including:

- Australian Plastics Recycling Survey NSW State Data Report—Part B, which provides annual data consumption of key single-use and problematic plastics
- monitoring compliance with regulations
- Key Littered Items Study, and other potential metrics including the Australian Litter Measure (AusLM) and Australian Marine Debris Database.

Benchmarks are partial measures that provide a means of detecting relative changes in plastic consumption. If they are representative of what is changing at a larger or population scale, then the change in the benchmark may be taken as a proxy for the change in the target population. Having a set of benchmarks can also give an indication of confidence or reliability.

A simple 'stocks and flows' or 'mass balance' approach to the problem of measuring consumption is illustrated in Figure 4. Consumption is the flow rate of plastics from production to consumers in units such as tonnes per annum. Mass balance implies that consumption can be measured as flows and changes in stocks at 3 different levels. These are the:

- flow of domestic production and imports of plastic products, directly as products or indirectly as packaging, into NSW per annum plus or minus the change in inventories over the reporting period
- direct and indirect quantity of plastics purchased by consumers plus or minus the change inventories held by households
- flow of materials from consumption to disposal (and the change in the level of stocks in plastics at their final point of disposal).



**Figure 4. Stocks and flows of single-use plastics<sup>34</sup>**

The proposed approach combines top-down and bottom-up benchmarks to form a comprehensive assessment of the phase outs against key objectives: reduced consumption, regulatory compliance and reduced litter.

### **Top-down benchmarks for plastic consumption in NSW**

The department commissioned Envisage Works to conduct analysis of single-use plastic items in NSW as part of the annual plastic recyclers survey. This data provided a broad analysis of NSW consumption of single-use plastics. However, some of this data was from national data sources extrapolated for NSW based on a per capita basis. The data had some large margins of errors and would not be suitable as a single source of data for tracking progress against the state outcome indicator.

### **Bottom-up benchmarks for plastic consumption in NSW**

See the section 'Target: Reduce plastic litter items by 30% by 2025'.

### **Additional considerations**

The baseline year to track reduction in plastic consumption will be 2018–19 and the final measurement year will be 2024–25. Additions to the key item's list will require a new baseline year to be set.

Additional single-use and problematic plastics will be determined by the department based on several considerations in line with definitions provided earlier and guiding principles (Table 19).

The primary metric for measurement will be weight and the secondary metric will be units/count.

<sup>34</sup> Source: AnalytEcon

**Table 19. Summary of guiding principles for problem plastics**

Guiding principles	Justification
Contribute to negative impacts to human health	Plastic items or materials may have significant impacts on human health and wellbeing. This includes physical, chemical or biological impacts of the product.
Contribute to harmful impacts to the environment (organisms to ecosystems)	Once deposited in the environment, plastic can harm organisms by causing injury or death through suffocation, entanglement and ingestion. Plastic can also concentrate and transport harmful chemicals and can lead to ecosystem-wide issues.
Causing a market failure	A plastic item or material may lead to market failures if the costs of the plastic management is not substantially borne by the consumer or producer of the product.
Lead to inefficient use of resources	If plastic is over-consumed, or managed poorly, it can lead to waste management issues, inefficient consumption of resources and a loss of materials from the productive economy.
Precautionary principle	If there are threats of serious or irreversible environmental, human health, economic or social damage from a plastic product, action may be warranted, and a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental, human health, economic or social degradation.
Negative economic impacts	Consumption of the product damages the NSW economy or economic situation of segments of the community. These externalities may not be substantially borne by the consumer or producer of the product.
Negative social impacts	Consumption leads to significantly reduced quality of life/standard of living of the NSW community. This can include impacts of segments of society, including vulnerable and disadvantaged groups. These externalities may not be substantially borne by the producer or consumer of the product.

### Target: Triple the proportion of plastic recycled in NSW by 2030

Phase outs and design standards will lower the total tonnage of plastic waste generated in NSW. This will impact the recycling rate accordingly.

Plastic recycled in NSW is the tonnage of recovered plastics (excluding that sent to energy recovery) and includes scrap plastic sent interstate and overseas for reprocessing. This excludes reused products.

The proportion of plastic recycled is calculated using waste generated (that is, end-of-life disposal), which is the sum of recovered plastics and plastics destined for landfill. This does not include plastic loss to the waste management system through leakage.

The baseline year for the target will be 2018–19, which had a recycling rate of 11%.

Primary data sources will be:

- Australian Plastics Recycling Survey NSW State Data Report
- Waste Avoidance and Resource Recovery Strategy 2014–21/Waste and Resource Reporting Portal
- the most appropriate method for determining disposal available at the time.

To our knowledge, there is no data collection scheme to quantify key single-use and problematic plastics recycled or sent to landfill. However, by definition, it is assumed that all single-use and problematic plastics targeted in the initial phase outs and design standards are non-recyclable. Accordingly, their final disposal destination will be either landfill or litter.

## Target: Reduce plastic litter items by 30% by 2025

The primary data source will be the Key Littered Items Study (KLIS). Other litter measures, including the AusLM and Australian Marine Debris Database, can also be used to track progress against the target.

The KLIS samples NSW metropolitan estuaries and remote beaches quarterly, starting from March 2017. The KLIS provides a level of granularity that is suitable to measure change in litter quantities of the key single-use and problematic plastics. The KLIS is an efficiently designed survey with repeated observations from the same location, time and tidal conditions. The sample size is sufficiently large, particularly when supported by statistical modelling.

The baseline year for the target will be 2018–19.

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## Appendix 1 – Stakeholders who provided written submissions

- Australian Industry Group
- ALDI
- Australasian Circular Textile Association
- Australian Association of Environmental Education – NSW chapter
- Australian Beverages Council
- Australian Bioplastics Association
- Australian Food and Grocery Council
- Australian Marine Conservation Society
- Australian Packaging Covenant Organisation
- Australian Retailers Association
- Bayside Council
- Blacktown City Council
- Boomerang Alliance
- Business NSW
- Byron Shire Council
- Canberra Region Joint Organisation
- Cate Faehrmann MLC (NSW Greens)
- Cattai Hills Environment Network
- City of Canada Bay
- City of Newcastle
- City of Ryde Council
- Clean Up Australia
- Coca-Cola Australia
- Consumer Healthcare Products Australia
- Cooks River Alliance
- Cooks River Valley Association
- CropLife Australia
- eBay Australia and New Zealand
- Exchange for Change
- Geelong Environment Council
- Georges Riverkeeper
- Green Music Australia
- Institute of Sustainable Futures, University of Technology, Sydney
- International Fund for Animal Welfare
- KeepCup
- Kempsey Shire Council
- Lake Macquarie Sustainable Neighbourhood Alliance
- Lane Cove Sustainability Action Group
- Local Government NSW
- Mark Coure MP (Member for Oatley)

- Mars Australia
- MidWaste
- National Retail Association
- Nestlé
- No Balloon Release Australia
- North East Waste
- Northern Beaches Council
- Northern Sydney Regional Organisation of Councils
- NSW Circular
- NSW Young Labor
- Parramatta River Catchment Group
- PepsiCo Australia New Zealand
- Positive Change for Marine Life
- Public Health Association of Australia
- RecycleSmart
- Sea Shepherd
- Southern Sydney Regional Organisation of Councils
- Suez Australia and New Zealand
- Sustainable Organisations of the Sutherland Shire
- Sydney Olympic Park Authority
- Sydney Water
- Tetra Pak
- Unilever Australia New Zealand
- Vinyl Council of Australia
- Waste Management and Resource Recovery Association of Australia
- Western Sydney Regional Organisation of Councils
- Western Sydney Leadership Dialogue
- Woolworths
- World Wide Fund for Nature

## Appendix 2 – Targeted stakeholder consultation

- Australian Beverages Council
- Australian Council of Recycling (ACOR)
- Australian Food and Grocery Council
- Australian Packaging Covenant Organisation (APCO)
- Blackmores Australia
- Boomerang Alliance
- Coca Cola Amatil
- Consumer Healthcare products Australia
- IDEAS Australia (National Disability Information Services)
- Local Government NSW (LGNSW)
- NABERS and Sustainability Advantage (internal)
- National Retail Association
- Nestle Australia
- NDIS Quality and Safeguards Commission
- NSW Aging and Disability Commission
- NSW Circular
- Office of the Chief Scientist and Engineer
- People with Disability Australia
- South Sydney Regional Organisation of Councils (SSROC)
- Spinal Cord Injuries Australia
- Stroke Recovery Association
- The Disability Council NSW
- The Physical Disability Council of NSW
- Unilever Australia New Zealand
- World Wildlife Fund