

Scotland's Litter Problem

Quantifying the scale and cost of litter and flytipping



Zero Waste Scotland works with businesses, individuals, communities and local authorities to help them reduce waste, recycle more and use resources sustainably.

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This report draws heavily on research commissioned from Eonomia Research and Consulting and Brook Lyndhurst

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1 Executive Summary

1.1 Introduction

Tackling litter and flytipping is an integral part of achieving a zero waste society – a society where the value of resources is recognised, we use (or reuse) them more efficiently, and where they are recycled rather than thrown away, retaining value in Scotland's economy. Litter and flytipping impose significant financial costs on national and local government, businesses, and other organisations, many of which are ultimately borne by the public, either as taxpayers or customers. Litter and flytipping represent waste that is disposed of illegally and irresponsibly, and – because there is significant potential to recycle these materials - tackling the problem is central to the ethos of a zero waste society.

In the course of 2013, the Scottish Government is consulting on and developing a strategy to tackle litter and flytipping more effectively. To inform this process, and supported by the Scottish Government, we began a programme of research to identify:

- How much littering and flytipping takes place in Scotland,
- What waste types litter and flytipping is made up of,
- What litter and flytipping costs Scottish society each year,
- What is known about the causes of the problem (specifically in relation to littering), and
- Evidence on effective countermeasures

This report summarises that research programme. Some areas relating to this issue are better evidenced than others. Therefore this report highlights both what we know, and what we don't know.

Two independent studies were commissioned to inform this report and are published alongside it for readers wanting more detail. These are studies by Brook Lyndhurst, *Rapid Evidence Review of Littering Behaviour and Anti-Litter Policies*, and Eunomia, *Exploring the Indirect Costs of Litter in Scotland*. In addition, Eunomia conducted survey work with Scottish local authorities to better understand litter and flytipping costs and estimates of waste volumes. Environmental charity Keep Scotland Beautiful also provided assistance in collecting information on current local authority practice and community initiatives.

Both litter and flytipping can be considered as “waste in the wrong place”, but littering relates to the wrongful disposal of single items (e.g. a crisp packet, or drinks can), whereas flytipping relates to the disposal of larger amounts of waste. This report's facts and figures focus on waste in the wrong place (and therefore exclude rubbish that is correctly deposited in public “litter” bins, and the costs of dealing with leaves and other naturally occurring material). And while the consequences of litter and flytipping may be similar – unsightly waste which has expensive consequences - the behavioural drivers and counter-measures required are not.

1.2 Quantifying the problem

How much litter and flytipping waste is there?

- At least 15,000 tonnes (t) of litter is disposed of into our urban and rural environment and is subsequently cleared by local authorities every year.
- This equates to approximately 250 million easily visible items every year.
- Over 80% of the litter stream consists of potentially recyclable material and indeed 50% of this material could have been easily recycled, had it been properly disposed of.
- At least 26,000t of waste is illegally flytipped each year and dealt with by local authorities, with an estimated 61,000 incidents occurring per year. This estimate excludes the vast majority of cases occurring on private land.
- The total amount of litter and flytipping is higher than this. There is currently no data available on the amount of litter cleared from private land. And it is also the case that in some instances, material can lie uncollected (and uncounted) for long periods of time.

What are the direct costs of tackling litter and flytipping?

Based on the Eunomia survey, this report identifies the following direct costs of dealing with and minimising litter and flytipping:

- Scotland spends at least £53 million of public money on litter and flytipping each year.
- The vast majority of identified spend comes from local authorities. Local authorities spend £45 million on clearance (just over £36 million for litter, and £8.9 million for flytipping), £6.5 million on enforcement (£4.5 million for litter, and £2.0 million for flytipping), and £0.86 million on education and awareness (almost all relating to litter).
- Other public bodies, including other duty bodies identified, spend at least an additional £1million on activities associated with litter and flytipping.
- Private sector costs cannot be systematically calculated, though some illustrative examples are given in the main report.
- The value of resources thrown on the ground as litter is estimated to be £1.2 million. The extent to which this was recoverable would depend on how material was collected if it was not littered.
- The value of resources in the flytipping stream cannot be quantified, due to a lack of detailed data.

What are the indirect costs of litter and flytipping?

- Indirect costs are the negative impacts or consequences of litter that impact on society more widely with the implication that someone, somewhere, is paying them.



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- Looking at the evidence presented, we have concluded indirect costs are likely to exceed £25 million, and it is not unreasonable to suggest that they could be much higher.
- Further costs might reasonably be associated with marine litter – over £10 million of the total £17 million costs identified in a separate analysis by Marine Scotland seem highly likely to be additional to the above estimate, and the Marine Scotland estimate as a whole is stated to be a low end figure.
- Therefore the combined costs of terrestrial and marine litter are highly likely to exceed £35 million, and could be much greater.

The true value of a litter free environment

- The Eumonia study also looked at the value Scots place on a litter-free environment. Unlike the costs represented above, these numbers show what the population might be “willing to pay” for a cleaner environment. These figures demonstrate value – what people believe something is worth to them.
- The value placed by the population on litter-free beaches was identified between £50 million and £100 million.
- A conservative estimate of how much Scots value litter free neighbourhoods would be £73 million a year. Other estimates identified in the course of this research are much higher.
- Based on those two figures, it seems reasonable to conclude that overall, the value Scots would place on a cleaner Scotland can be conservatively estimated at at least £100 million.



Images 1 – 4: Litter and flytipping are highly variable in scale, type and location

1.3 Causes and countermeasures

In considering behaviours, this report focuses specifically on litter rather than on flytipping. Littering is generally the result of small-scale individual actions, sometimes deliberate, but often lazy or thoughtless. Flytipping is commonly accepted to be associated with wilful criminal activity.

Who litters?

- No single group or demographic are inherent "litterers". Around half the population admit to having littered "at some point", whether deliberately, accidentally, or simply without thinking.
- Though some demographic groups are more likely to litter, they may be motivated to do so by particular circumstances that they find themselves in.
- The vast majority of litter in Scotland is judged to have arisen from the general public (in 98% of areas surveyed). While certain business types (such as fast food outlets) are commonly associated with litter arisings, the general public are typically responsible (deliberately or accidentally) for transferring this packaging into our environment.

Why do people litter?

The Brook Lyndhurst review identified a wide variety of potential causes of littering behaviour.

Individual factors frequently cited as causes of littering include:

- people's perception of space (if it is seen as "clean" and "cared for" littering is less likely)
- the item in question, with some people more likely to litter items they think (wrongly) do not 'count' as litter (such as an apple core), or that they wish to "get rid" of quickly.
- laziness and the inconvenience of using an available bin or taking waste home.

In practice, most littering actions are habitual, rather than the result of a conscious decision.

Social factors are influenced both by what people see (the state of the location they are in, and the behaviour of others) and what people believe is expected of them (the extent to which they think the issue matters to wider society).

The most obvious **material factor** in the context of litter is bin provision. Adequate provision of well serviced facilities can certainly reduce the incidence of littering. But littering still occurs in well provisioned areas, so they should not be considered the whole solution. More broadly, people's perception of how clean a place is is of course partly dependent on the general condition and maintenance of that place.

What countermeasures work?

Education and awareness covers a wide range of activity from small-scale local initiatives (perhaps in the context of a single school) to national communications campaigns (which have been undertaken in a number of countries). Communications activities can be significant in ensuring the public understand the negative consequences of litter, and that littering actions are considered socially unacceptable. Communications can also play a key role in enforcement, where awareness is a key component of effective deterrence.



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The infrastructure most commonly referred to was bins. The introduction of new technology such as electronic monitoring and reporting of fill levels has the potential to provide improved evidence that could help organisations optimise the deployment of bins. This may in turn enable those organisations to maximise the value of captured materials and potentially reduce servicing costs. However, the provision of bins is not, in itself, the solution to the problem.

Infrastructure changes can also include quite different measures. Opportunities to litter can be reduced by packaging changes, whether at a local level (e.g. a specific retail outlet) or via national initiatives.

In the context of flytipping, infrastructure such as physical barriers and CCTV have also proven effective at individual sites.

Enforcement is another common anti-litter measure. While data on enforcement measures is easily obtained, the true value of enforcement is when it deters future offending. The deterrent value relates to both the size of penalty, and also to people's expectation that they will be caught and punished. Ultimately, the success of an enforcement regime should be measured by the extent to which it deters littering.

Finally, measures to better understand littering and flytipping frequency and locations aid both prevention and enforcement.

What is being done?

Action is already being taken to control litter in Scotland – by government, local authorities, public bodies, charities, community groups, and individuals – and via a wide variety of methods, including the full range of education, enforcement and infrastructure options currently available. Without these efforts, the scale of Scotland's litter problem would be far larger.

However, as this report indicates, current activity still leaves us with a significant problem with hundreds of millions of littered items, tens of thousands of flytipping incidents, and tens of millions in associated direct and indirect costs. The Scottish Government's National Litter Strategy will support a clean, safe environment for people who live in and visit Scotland - where littering is no longer acceptable.

1.4 Conclusions

Scots value a litter free environment very highly – at over £100 million a year. And yet, at least 250 million items are littered every year, and over 61,000 flytipping incidents occur. The direct cost to the public is over £50 million, which includes costs associated with cleaning public places, enforcement and education. Local authorities foot the bill for the vast majority of this spend. Though not quantified in this report, the clean-up bill for other organisations is also likely to be significant.

The wider impacts on our society, economy and environment are even greater. This report conservatively estimates that the hidden costs of litter to public services, individuals and wildlife will exceed £25 million, and suggests that they may in fact be much greater.

This report also identifies a range of potential countermeasures, covering education, infrastructure and enforcement activities. Some of these have been shown to work in practice, others are promising, but have yet to be tested on a larger scale. The Scottish Government's National Litter Strategy will identify interventions to be taken forward for further investigation, and Scottish Government will consult on its proposed approach during 2013.



Image 5: Litter generally consists of small lightweight items. These can be highly mobile and can therefore readily accumulate in hard to clean locations.



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2 Introduction

Aims and rationale

Tackling litter and flytipping is an integral part of achieving a zero waste society – a society where the value of resources is recognised, we use (or reuse) them more efficiently, and where they are recycled rather than thrown away, retaining value in our economy. Litter and flytipping represent waste that is disposed of illegally and irresponsibly, and are wholly against the ethos of a zero waste society. Moreover, litter and flytipping can impose significant financial costs on national and local government, businesses, and other organisations (many of which are ultimately borne by the public, either as taxpayers or customers), as this report will demonstrate.

In the course of 2013 the Scottish Government is consulting on and developing a strategy to tackle litter and flytipping more effectively. To inform this process, we were asked by the Scottish Government to undertake a programme of research to identify:

- How much littering and flytipping takes place in Scotland,
- What waste types litter and flytipping is made up of,
- What litter and flytipping cost us each year,
- What is known about the causes of the problem (specifically in relation to littering), and
- What the available evidence base is on effective countermeasures

This report summarises that research programme. The existing evidence is stronger for some areas relating to this issue than it is for others. Therefore this report highlights both what we know, and what we don't know. Where improved knowledge may help us to deal with the problem more effectively, filling some of these gaps may be part of future government strategy.

Defining litter and flytipping

Litter is defined in Scotland's Code of Practice on Litter and Refuse as "waste in the wrong place"¹, and that is also the focus of this study. Although people frequently speak of "litter" bins, this study excludes waste in public bins because this has in fact been responsibly disposed of; the importance of this distinction is explained in more detail below.

Flytipping can also be considered as "waste in the wrong place". However, a more detailed description is: "Flytipping is the illegal dumping of waste – from a bin bag of household rubbish to large quantities of tyres or construction waste"². It is therefore the scale of the incident that differentiates littering incidents from flytipping. However, while flytipping is commonly associated with large scale dumping, in fact the most *frequent* incidents relate to the illegal disposal of everyday "mixed" waste, of the sort frequently associated with households (see [section 3.3](#) below).

Both litter and flytipping can negatively impact our communities, and in counting amounts of "waste in the wrong place" and the negative effects it causes (sections [3](#) and [4](#)), this report considers waste from both sources. In the behavioural section ([section 5](#)) a distinction is drawn between them however, as the drivers are quite different.

For this report we have focused solely on waste that is "in the wrong place", both in calculating volumes and associated costs.

This approach excludes a significant amount of waste that is often dealt with by local authorities at the same time as littered and flytipped waste – primarily naturally occurring materials like leaves, grit

and “detritus”, all of which accounts for tens of thousands of tonnes of material in Scotland’s waste stream. Clearing these remains an essential function, which maintains road quality, keeps drains clear, and improves street cleanliness. However, reducing littering and flytipping will not reduce volumes or costs for naturally occurring material.

This approach also excludes waste disposed of in public “litter” bins (and the costs of servicing those bins) as this does not represent “waste in the wrong place”. This is of course another essential local authority function, and one which plays a vital role in litter reduction (as legitimate disposal routes are frequently on hand for the public). Again however, reducing litter and flytipping will not reduce the volumes or costs of waste in public bins.

The structure of this report

[Section 3](#) answers the first two research questions – explaining how much litter and flytipping there is, and what it consists of. As no single source of data exists recording litter and flytipping volumes, this section draws on several different sources, including national waste data, compositional analysis of Scotland’s municipal waste, and assessments of street cleanliness. These sources were supplemented by a bespoke survey of local authorities we commissioned from Eunomia Research and Consulting (Eunomia) to better understand what was being recorded (and not recorded) in different systems by different authorities. This source is referred to as “the Eunomia survey” throughout this report. Greater details on the methodology and calculations that inform section 3 are in [appendix 1](#) (litter) and [appendix 2](#) (flytipping). As little or no data was available for litter and flytipping on non-local authority land, the report focuses on local authority land only in estimating tonnages.

[Section 4](#) looks at the costs of litter and flytipping. It considers four different aspects of this:

- The value Scots place on a litter free environment. Litter is a common cause of complaint, and is consistently identified as a leading cause of dissatisfaction with local environmental quality in the Scottish Household Survey. For this study we also sought to identify the financial value Scots would place on a litter free environment. This was part of a second piece of research commissioned from Eunomia, *Exploring the Indirect Costs of Litter in Scotland*³, which is published alongside this report. This is referred to as “the Eunomia study” throughout this report.
- The costs of clearing litter up. The Eunomia survey was integral to arriving at an estimate for what littering and flytipping costs local authorities. It also identified costs for enforcement and education associated with anti-litter and anti-flytipping measures. No systematic survey of costs for private organisations was possible, but some were able to share costs with us, and these are also given in this section.
- The indirect costs of litter. Litter and flytipping can have a financial impact on a wide range of services and activities, ranging from our health, to house prices. The Eunomia study on indirect costs is the main source for this section. This is the first time an attempt has been made to quantify this, and the estimated costs in this section represent a starting point for understanding the wider costs of litter and flytipping, rather than a final answer



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- The resource value of litter and flytipped waste (which is currently lost to our economy). This again focuses on waste dealt with by local authorities, and draws heavily on both pieces of work carried out by Eunomia.

The cost types identified in this section are quite different. In some respects they also overlap. Therefore they cannot be directly added up, though this section concludes by comparing them, and suggesting some likely figures for overall costs.

[Section 5](#) reviews our understanding of littering behaviour. Section 5 first considers our understanding of who litters, and why. This section draws heavily on work commissioned from Brook Lyndhurst, *Rapid Evidence Review of Littering Behaviour and Anti-Litter Policies*⁴, which looked at experience, knowledge, and practice both within Scotland and overseas. This is referred to as “the Brook Lyndhurst review” throughout this report. This review is published alongside our report. Section 5 then considers what can be done to change behaviour and prevent littering – by enforcement, through education, or by changes to infrastructure or processes. Flytipping is covered separately as some of the issues are unique. This section draws heavily on the Brook Lyndhurst review, but also on existing experience in Scotland derived from a number of formal and informal consultations undertaken over the course of this research programme. We would like to thank Keep Scotland Beautiful for their support in checking and summarising existing local authority practice in a number of key areas.

Finally [section 6](#) briefly highlights measures already in place, to demonstrate the range of actions that are already being taken. The Scottish Government litter strategy consultation is undertaken in the knowledge that many organisations have been working hard to tackle litter and flytipping to date, and this section reflects this.



Image 6: Whilst the distinction between litter and flytipping may sometimes be blurred, both are self-evidently “waste in the wrong place”

3 How big is Scotland's litter problem?

How much litter and flytipping is there in Scotland? This seems a simple question, but the widespread and indiscriminate nature of this problem means that quantifying it is challenging.

By its very nature, litter and flytipped waste does not occur in single locations where it can be easily measured. And there are a number of ways it can be measured – the two most common are item counts and weight counts. These different approaches can give quite different impressions of the size and nature of the problem.

Additionally, while measuring litter on the ground gives an accurate impression of how clean an area is at a given time, it may be a poor indicator of how much litter is actually dropped there. Frequent clear-ups by local authorities will result in an area appearing clean despite high quantities of rubbish being deposited. Equally, small amounts of waste that are not cleaned up, especially where they accumulate over time, will give an impression of an unclean environment, even if the littering causing the problem is in fact quite occasional.

A number of national data sources exist on litter and flytipping. WasteDataFlow⁵ is Scotland's national waste database, and contains some information on both litter and flytipped waste. However, local authorities understandably focus on cleaning up as quickly and efficiently as possible, rather than detailed measurement of the amounts involved. This means some litter and flytipped waste can be recorded in other categories where it makes sense operationally to combine waste during collection. A separate database, called Flycapture⁶, is used by a number of local authorities in Scotland, and contains more detailed information on flytipping incidents. Finally, Keep Scotland Beautiful administer LEAMS⁷ on behalf of Audit Scotland. This measures street cleanliness consistently across all local authorities. However, this is designed as a measure of local authority local authority performance in targetted areas, not of litter volumes.

All these sources are useful in quantifying litter, but none give a complete picture. We therefore also commissioned a survey of local authorities, conducted by Eunomia, to better understand what these different data sources were really telling us. This section gives our final estimates for litter and flytipped waste, but greater detail on the way in which we worked it out is available in [appendix 1](#). This section focuses on local authorities, as little or no data is available for other organisations, businesses, or landowners.

This section first looks at litter. Before quantifying the overall problem, we look at an "average" tonne of litter, highlighting that the large number of items concerned make it a big issue to deal with. This section also looks at just what a tonne of litter actually comprises. We then go on to quantify overall litter tonnages. Next we consider what is known about flytipping composition, and provide estimates for overall tonnage. A final summary adds the two together.

In calculating litter tonnages we have excluded naturally occurring waste materials that local authorities are responsible for clearing up. Leaves, grit, and other "detritus" are cleared by local authorities in very significant quantities⁸, and doing so is important in keeping streets safe, drains



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clear, and our environment looking clean and tidy. These elements are also excluded elsewhere in this report (for example when calculating clearance costs).

3.1 What does a tonne of litter look like?

This section focuses on litter. Flytipping is harder to picture, as the nature of the items being thrown away varies far more, and each incident can be different. Composition cannot therefore be calculated in the same way for flytipped waste. Information on flytipped waste is given separately below (see [section 3.3](#)).

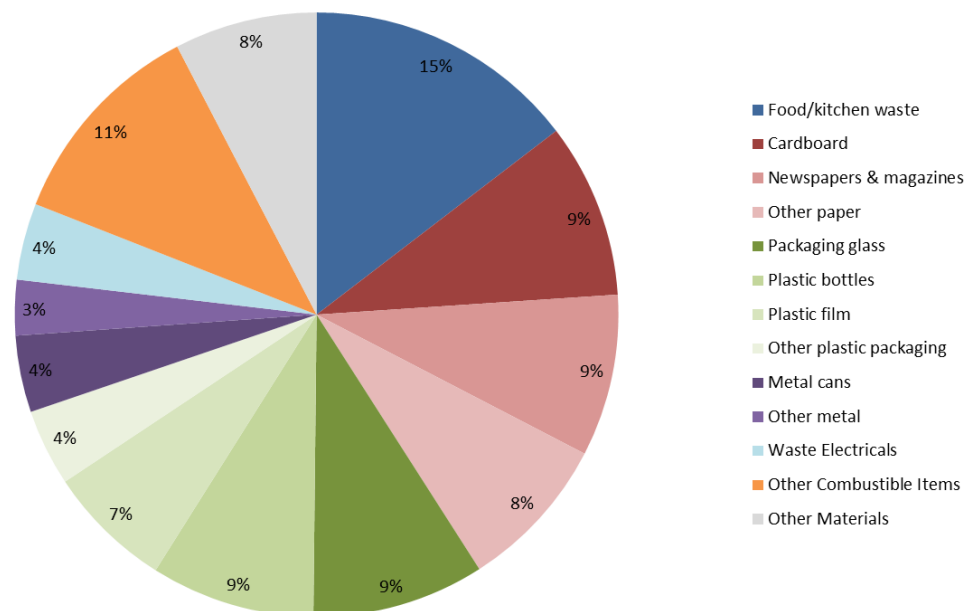
3.1.1 The composition of the litter stream

Before totalling up the amount of litter disposed of in Scotland, it is helpful to consider what the numbers actually mean. Waste is usually measured in tonnes – but what does “a tonne” of litter actually look like? Collected together in one place, it might not seem so much – it’s “just” 38 standard wheelie bins⁹. But a tonne of litter is likely to comprise over 20,000 easily visible items (see [appendix 1](#)). The true number of items would be higher, including small items like cigarette butts, which weigh almost nothing (though weight may not be the best measure of negative impacts, as discussed in more detail below). Thus even a small litter tonnage equates to a huge number of items.

Composition by weight

The composition of litter varies greatly from place to place. But for Scotland as a whole it is possible to talk about an “average” tonne of litter. The materials typically found in the litter stream are normal everyday items, many of them recyclable.

Diagram 1: Estimated composition of Scottish litter stream by material type¹⁰



Greater detail on how this composition was calculated are in subsequent sections of the report, and [appendix 1](#). As can be seen, by weight, it is common items like food waste, paper and card, plastics, glass, and metal cans that make up most of the litter stream.



Image 7: Small items like cigarette butts weigh almost nothing, but they can have a big visual impact. The scale of cigarette litter is much more apparent in item counts.

Contrasting weight and item counts

A slightly different picture of litter composition is given if we look at the prevalence of given items, rather than weight alone. Information on types of litter seen can be obtained from assessments of street cleanliness¹¹. While not representing the full range of littered sites, the results suggest that in an item count, smoking related waste is the most prevalent litter type, seen in over half of all assessed sites in 2010/11¹². In contrast, in weight-based studies like those informing the compositional diagram above, cigarette litter is seldom noticeable (or specified as a category in analysis), as each individual item is so light. Drinks and confectionary litter were found in a third of locations assessed for street cleanliness, with fast food related litter at one in ten sites assessed¹³. Drinks litter was particularly prevalent along major road routes¹⁴.

Anecdotally, certain items, such as disposable carrier bags, are often cited as being particularly prevalent in the litter stream. Seeking to quantify the number of carrier bags littered is the focus of Feature Box 1.

Feature Box 1: What about carrier bags?

Anecdotally, carrier bags are often identified as a prevalent component of litter. We looked at the available data to explore to what extent this is in fact the case.

Carrier bags make up a small element of the litter stream by weight – just 1.7% in a 2009 national study of waste composition¹⁵. However, like other thin plastic film, when they appear as litter they are highly visible (brightly coloured and with a large surface area) and highly mobile (due to a very low weight), especially in windy conditions¹⁶. A single tonne of clean new thin gauge carrier bags would represent 125,000 bags¹⁷.



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740 million single use carrier bags were handed out by the major food retailers in Scotland in 2011¹⁸, and the total number of bags used is in fact higher, as other retailers, large and small, make extensive use of single use bags. All of these are eventually disposed of. In the same national waste study referred to above, around 2% of the total weight of carrier bags in the Scottish waste stream turned up in street cleansing totals; assuming this is still the case, this would be around 17 million bags. Many will have been correctly disposed of in litter bins. However, for street waste as a whole, this study suggests around 44%¹⁹ is not placed in bins. If true for carrier bags as well, this implies at least 7.4 million bags retrieved by local authorities from Scotland's wider environment²⁰.

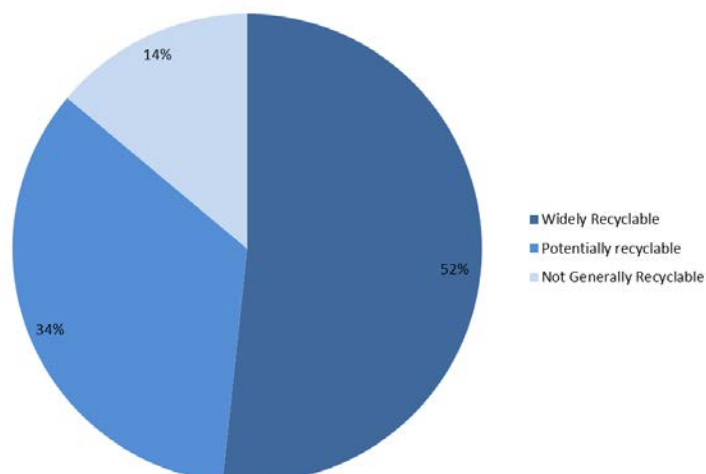


Images 8-9: Carrier bags and other types of thin plastic film are highly mobile and can become caught in trees and undergrowth far from their point of origin.

3.1.2 How much litter could have been recycled?

For each tonne of litter generated, much of the waste could in fact have been recycled, had it been disposed of differently. We categorised each material stream discussed in section 3.1.1 above as either "widely recycled" (e.g. the types of material that feature prominently in local authority collections), potentially recyclable (e.g. materials that can be recycled, but which might require greater effort to recycle), and those which are not, generally, recyclable at present. A full list of materials assigned to each group is in [appendix 1](#).

Diagram 2: The percentage of Scotland's litter that can be recycled



Around 39% of litter waste by weight consists of items that feature frequently in Recycle on the Go provision – paper and card (26%), plastic bottles (9%) and cans (4%)²¹. It is important to note that plastic bottles and cans both have a relatively low per item weight, and so these percentages are likely to represent a very large number of items. In contrast the weight of paper seen in litter waste may appear disproportionately high if significant amounts of water have been absorbed prior to measurement.



Image 10: Plastic bottle litter. Many materials in the litter stream could have been easily recycled if disposed of properly

3.2 How much litter is there in Scotland?

The first section tells us what littered waste is made up of. This section looks at how much there is in total. Litter volumes are challenging to measure on a national scale with tens of millions of items wrongly disposed of across the country over the course of a year. The best point to measure the amount of litter is at the point it is cleaned up.

3.2.1 Litter collected by local authorities

As explained previously, we have drawn on a number of sources in estimating overall littered tonnages in Scotland. Further details of this approach, which used WasteDataFlow data as a starting point, and the Eunomia survey to help adjust figures where necessary, and inform estimates where data was missing, are available in [appendix 1](#)

As we discounted naturally occurring material (most significantly that arising from mechanical road clearing), and also estimated how much of the remaining waste had in fact been correctly disposed of in public bins, our final estimate of 15,866t of litter is much lower than any totals that appear on



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WasteDataFlow. This process also highlighted the variety of ways in which litter is cleared and counted, so there is uncertainty associated with our estimate. For this reason we quote this figure to the nearest thousand tonnes, rounded down, in the executive summary, giving a total of 15,000t. However, we are confident that our relatively conservative final estimate gives an accurate impression of the scale of Scotland's litter problem.

15,866t may seem small compared to the overall amount of waste produced in Scotland. But it must be remembered that this will equate to around 250 million easily visible items²², and that this figure counts only that element of the litter stream currently cleared by local authorities.

3.2.2 Litter that is not collected by local authorities

Section 3.2.1 calculates the amount of litter cleared annually by local authorities. However, this estimate will not reflect the full scale of the problem, and more litter than this is generated each year. Two key elements are responsible for this.

Additional litter tonnages will be cleared on both other public land (e.g. hospitals, schools, and the transport network), and private land (e.g. stadiums and shopping centres). In exploring whether litter on these sites could be quantified, we spoke to a small number of organisations to understand their current practice. Few of these sites count or record litter independently from other waste generated. While some could estimate costs (see [section 4.2.2](#)), none were confident estimating tonnages. On this basis, we did not seek to arrive at a national estimate, though it seems safe to conclude that significant additional litter tonnages are being cleared across a wide range of public and private sites.

Section 3.2.1 counts only litter that is cleared. In practice, the rate at which litter is cleared may not match the rate at which it is deposited, and litter does accumulate in areas which cannot be readily cleared (e.g. in undergrowth or behind fencelines). This is understandably a common cause for public complaint. To some extent the annual figures will account for this (with the waste cleared at some point, and a representative amount of this clearance activity caught in the annual figures). However, some litter will not be retrieved, and will rot away or become buried. The scale of uncollected litter is unknown. While it may be relatively significant in tonnage terms as it lies on the ground, it would not be expected to add much to annual totals. Many sites of accumulation have built up over long periods of time.

3.2.3 Understanding changes over time

While we are confident the estimate for litter volumes gives an accurate impression of the amounts collected by local authorities, there are uncertainties associated with this data. The figure therefore does not provide a robust baseline to measure change going forwards, as improvements in the rate of clean-up, or in the detail of reporting, could change the apparent total, independently of any change in the actual amount of waste that is littered.

It is also the case that there is no historical tonnage data to compare the current estimate against. However we can seek to understand changes in litter volumes indirectly in two ways.

As previously mentioned, local authorities do measure street cleanliness in defined areas. The scores obtained in these assessments have improved over time. This suggests targeted areas are cleaner, but this is as likely to reflect frequency and quality of local authority cleansing, as it is an actual reduction in the rate of littering²³.

The Scottish Household Survey has also measured levels of public concern about littering over time²⁴. A slight reduction can be seen in recent years, though a change to question design may have influenced this²⁵. Responses to this question reflect public concern, not actual levels of littering, so any conclusions about actual amounts of litter based on people's perceptions are of necessity indirect. Greater detail on these sources is available in [appendix 1](#).

Taken together the two measures suggest there may have been a slight reduction in litter levels in recent years, but this cannot be concluded with confidence.

3.3 How much flytipping is there in Scotland?

Different local authorities count flytipping in different ways, and two national reporting systems are in operation. As with litter, we have combined a number of sources in arriving at a volume estimate for flytipping, drawing on WasteDataFlow, Flycapture, and the Eunomia survey of local authorities. Details of how this was done are in [appendix 2](#).

Number of incidents and tonnages

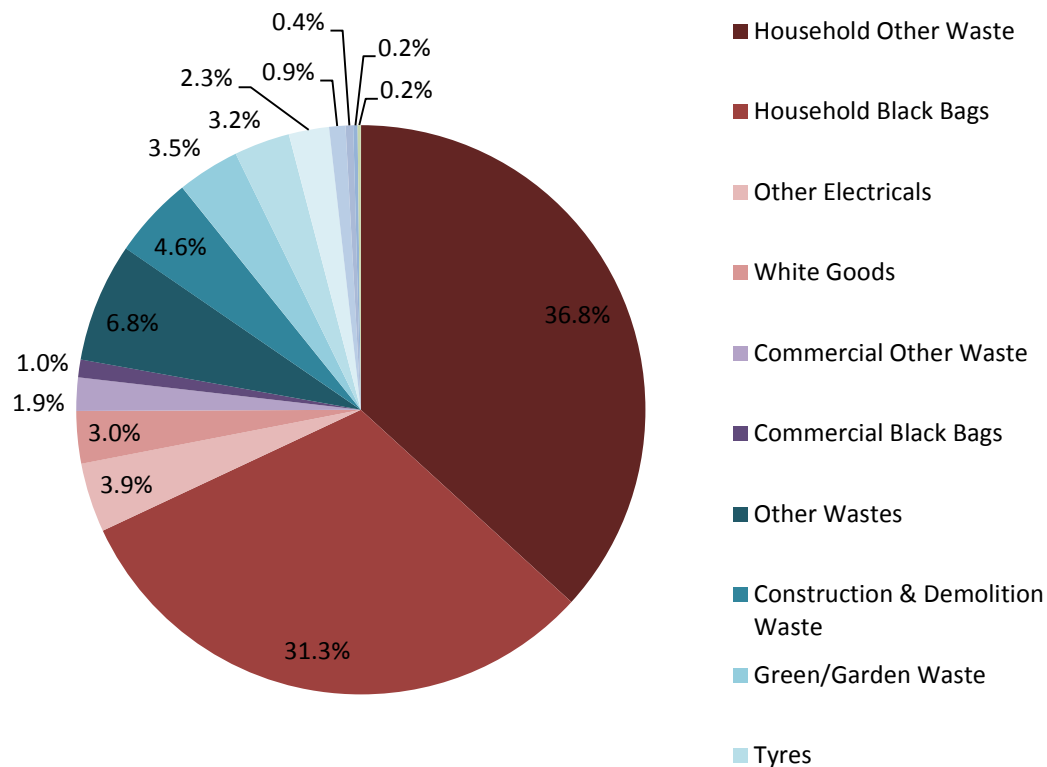
There were an estimated 61,227 cases of flytipping recorded by local authorities in Scotland in 2011; most of these will be on land for which the local authority has some responsibility, though some authorities will also record incidents on private land. Flycapture data can be used to understand the range of incident sizes represented in this headline data, and to estimate an average weight per incident. Based on this, we estimate that there are 26,756t of flytipped waste in Scotland per year. As with the litter total, we quote these numbers to the nearest thousand, rounded down, in the executive summary, giving a figure of 26,000t.

Analysing waste types and incident sizes

Flytipping incidents vary significantly in size and in the type of waste deposited. Although detailed data comes primarily from local authority land, the pattern of incidents on private land is likely to be very similar. It should be noted that both diagrams in this section show the frequency of incidents, not the tonnage.



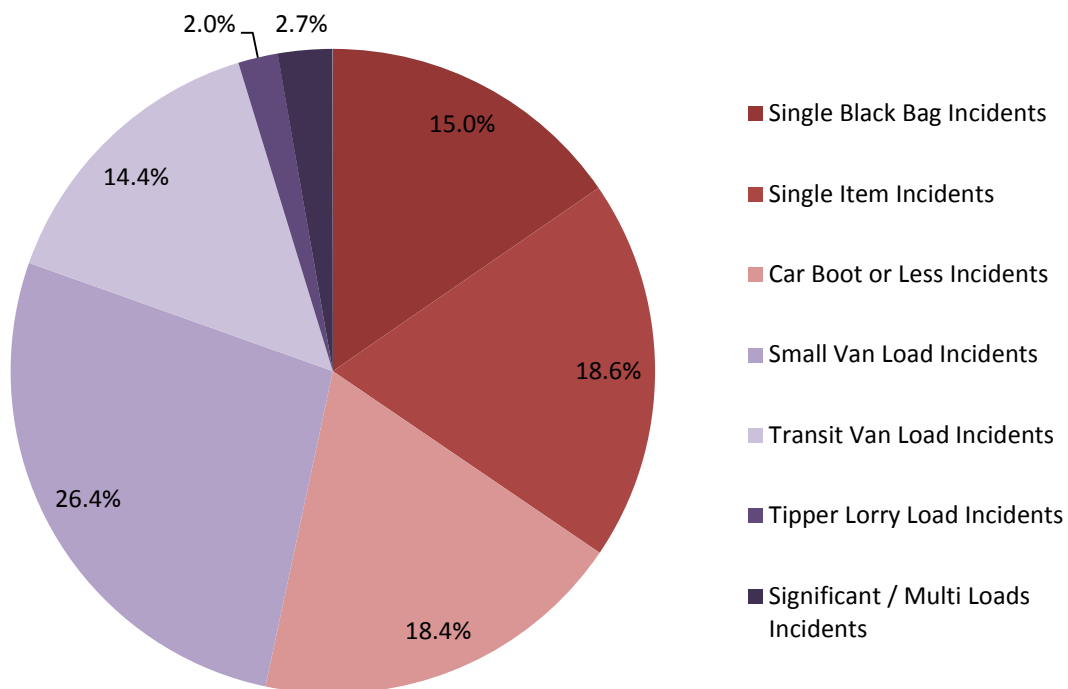
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Diagram 3: Frequency of flytipping incidents involving different types of waste²⁶

The above diagram suggests that household waste is the largest component of flytipping in Scotland, and this is true in terms of the *number* of incidents. This may not come from householders themselves directly flytipping waste (though this does happen); waste may have been collected by someone without a legitimate waste carrier's licence and disposed of illegally without the householder's knowledge. This category will also include waste from other sources with the "mixed" aspect of household waste (i.e. general waste, often deposited in black bin bags; some of this can also arise from business sources).

However, this diagram is unlikely to accurately reflect the actual *tonnages* dumped illegally, in which other sources (dumped in larger quantities, and potentially weighing more) would be much more significant. Incident size data (see below) suggests many incidents are too large to have been committed by individual householders. 46% of incidents involve the use of a van, or larger vehicle, clearly implying a higher degree of organisation. As these individual incidents will weigh much more than the smaller incidents recorded, they will account for a much greater share of the total tonnage than is implied simply by counting the number of incidents.

Diagram 4: Frequency of flytipping incidents of different sizes²⁷



Unfortunately, no data exists to show tonnages for different types of incident. However the size of incidents can be used to estimate the likely tonnages associated with each one, by estimating an average weight (see [appendix 2](#)). This is particularly effective with smaller incidents, where there is a clear maximum weight limit (i.e. only a certain amount of waste can fit in a black bag). On this basis, single black bag waste, single items, and car boot loads seem unlikely to account for much more than 5% of all flytipped waste by weight. We have assigned an upper limit of 10% by weight to allow for uncertainty in how this estimate was made, and this assumption is used later in estimating costs²⁸.

These smaller incidents are still crimes, and the large number, and indiscriminate nature of the locations where they are likely to occur, may make them more visible to the general public. However, it seems likely that most of the flytipping by weight (potentially 90% or more) is deposited in association with larger scale incidents, ranging from individuals using vans to dump larger quantities of waste on behalf of themselves or others, to even larger scale illegal dumping.



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Trends over time

It is not possible to discern a clear trend in flytipping levels in Scotland over recent years, though historical data on incident numbers is included in [appendix 2](#). Changes in totals may well reflect changes to reporting practices, rather than changes in the actual incidence of flytipping. In future data quality may improve, with a new reporting system undergoing local trials in late 2013. This is expected to not only improve understanding of flytipping levels, but, more importantly, to also aid prevention and enforcement measures at both local and national level.



Image 11: Flytipped waste consists of a wide variety of materials. Detailed information on waste composition is not currently available.

3.4 Summary: Adding it all up

In tonnage terms, we therefore estimate that litter and flytipping waste dropped or dumped in Scotland, and subsequently dealt with by local authorities, is at least 41,000t a year.

This comprises 15,000t of waste that are littered, and 26,000t that are flytipped.

We estimate that over 80% of the litter dropped could have been recycled if disposed of in an appropriate facility, with over 50% consisting of items for which recycling facilities are already widespread. We cannot estimate the percentage of flytipped waste that would have been recyclable, but it seems very probable that significant amounts of this waste could be recovered²⁹.

This estimate excludes significant quantities of waste that local authorities deal with, and which are often added into street cleansing totals – most significantly waste that is naturally occurring, and that disposed of legitimately in public bins.

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This estimate includes litter and flytipped waste that is collected by local authorities, but is not recorded separately in national waste data reporting.

These tonnages are small compared to the total volume of Scotland's waste. However it is the manner in which they are disposed – widely and indiscriminately – that makes them challenging and expensive to deal with, and that causes public concern. These are the subjects of the next section.

Litter on private land, and that lying uncollected, is excluded from these estimates as insufficient data exists. Both of these elements would be additional to the estimates given here.



Image 12: Local authorities work hard to clear litter from public areas, such as the road on the right. However, litter can easily accumulate nearby.



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4 Why does it matter?

The answer may seem obvious, but as well as being a frequent cause of public complaint, litter and flytipping impose significant financial costs. Litter imposes social, economic and environmental burdens on Scotland. The nature of these costs is varied. Some are direct and obvious (such as clearance or enforcement). Others are hidden, but also impose a financial burden (such as costs from increased crime, fires, or to the NHS). And others are more abstract (such as social disamenity) because no one currently pays for the damage or unhappiness caused.

This section starts by seeking to identify the value Scots themselves put on a litter-free environment. It then considers “direct” costs: firstly clearance costs (primarily for local authorities), and secondly costs for enforcement and education activities. The next section looks at “indirect” costs; financial burdens resulting from litter and flytipping, but which are not immediately apparent (e.g. those to health or other public services). Although classed as “indirect”, many of these have a real cost associated with them, that is ultimately borne by taxpayers, customers, or businesses. We then look at the lost resource value of litter and flytipping, and consider what this means for a zero waste society. Finally, while the figures in the section cannot be directly added up, as they represent a range of different cost types, and overlap in some respects, the final part of this section seeks to compare these costs, and identify what the overall costs of litter could be.

4.1 Public concern

The Scottish Household Survey consistently shows litter as one of the most common neighbourhood problems – cited by 25% of respondents in 2011 (slightly behind dog fouling on that occasion, though top in previous years – both these issues are far ahead of other anti-social behaviour)³⁰. 18% stated they have “experienced” litter as a problem³¹ – though most Scots will have seen some litter, this suggests 1 in 5 are sufficiently put out by it to consider it as having had an impact on them. Litter is perceived to be far more common in our poorest communities³², and less prevalent in rural areas³³. This perception matches the actual amounts of litter observed in national cleanliness surveying³⁴.

What are the negative impacts of litter to the public? There is the cost of clean-up by local authorities, ultimately paid for through taxation, and discussed in [section 4.2](#). And there are multiple indirect impacts, with associated costs, all of which are borne, ultimately, by taxpayers or customers (where businesses are forced to pass costs on), and which are dealt with in [section 4.3](#).

But there is also an indirect cost to the population as a whole³⁵ – litter can breed a fear of crime, injury, or simply discourage the use of public spaces. It can reduce our enjoyment of our towns, villages and countryside. People value a clean environment, even though no money actually changes hands. So litter can adversely impact people’s quality of life, irrespective of itemised impacts in specific areas, though it is of course hard to quantify this effect. Economists would refer to the unhappiness caused by a problem such as littering as “social disamenity”.

Quantifying the value people put on a litter free environment, or the social disamenity caused by a littered environment, is complex. One approach to quantifying this is “willingness to pay” methods. In a willingness to pay study, the public are asked to rank different outcomes. The value of those

which cannot be given a financial value (such as a litter free environment) can then be compared against others where a financial value is known. This can then be used to estimate the value the public place on a particular outcome.

The figures arrived at in willingness to pay studies do not necessarily mean people would be happy to pay this if presented with a bill. But they do give a good impression of how important an issue is seen to be.

The Eunomia study commissioned to inform this report applied evidence from other countries to Scotland to calculate a willingness to pay for, and thus put a value on, a litter free environment. The outcomes of this depend on the method and assumptions used. However, the lowest social value for litter in local neighbourhoods in Scotland derived from the studies analysed was £73m³⁶. And the highest was a staggering £770m³⁷. The research team's preference was for a figure of around £500m³⁸, though we have chosen to quote the lowest estimate available throughout the rest of this report, to reflect the relatively high levels of uncertainty associated with these estimates. Litter was consistently costed as more of a problem than other issues of local environmental quality in the one study that compared across categories³⁹.

A specifically Scottish study looking at how much we value litter free beaches was also analysed by Eunomia. This suggests Scots value clean beaches at between £50m and £100m⁴⁰.

Taken at face value, at first glance these amounts seem extremely high. But they are consistent with the ranking of litter concerns in the Scottish Household Survey. And the amounts per person are typically easier to visualise. The study looking at Scottish beaches equates to a "willingness to pay" for a clean environment of £1.35 per person per trip, or £12.39 per person per year, including those who do not visit our beaches⁴¹. Perhaps they are not so high after all. It is worth noting that tackling Scotland's litter problem would not cost this much – and in fact the remaining sections of this chapter suggest that tackling the problem could bring about real financial savings.

These figures, which measure the value Scots place on a clean environment, perhaps represent why the litter problem matters more than the tangible costs for our local authorities, public services and business, described below. Social disamenity should perhaps not be seen as additional to these more tangible costs (and indeed, in estimating social disamenity, respondents may be factoring some of these other costs into their calculations) but as an overall measure of how important this issue is to the population.



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Image 13: Litter is not just an urban problem. Even a small amount can detract from our enjoyment of locations like beaches or mountains.

4.2 The costs of cleaning it up

4.2.1 The costs of local authority clearance activity

Calculating clearance costs for local authorities is complicated. Litter and flytipping clearance is one of many key functions carried out by “street cleansing” departments or their equivalent. These functions include provision of public bins for legitimate waste disposal, and clearance of naturally occurring waste (which can block drains, lead to deterioration in road quality, and also impact the overall cleanliness of an area). Where street cleansing is part of a broader department (e.g. “parks and gardens”) then a much broader range of functions may also be included. A final complication is that litter and flytipping clearance can also be split across departments within a local authority (e.g. ultimate waste disposal is usually a different service area). And the facilities, equipment, and staff delivering these services are often used for a range of tasks, not just litter clearance.

The Eunomia survey undertaken to inform this research involved speaking to local authorities in detail about how much they were spending on litter and flytipping clearance in isolation – i.e. solely the spend associated with “waste in the wrong place”. Where resources were shared across other, unrelated tasks, local authorities were asked to estimate⁴² the share dedicated to litter or flytipping clearance. Not all local authorities were able to provide the same levels of detail, as this depended on how different services were accounted for, and the availability of key personnel for interview. Where data was unavailable, it has been modelled, using conservative assumptions, between local authorities. Greater detail is given in [appendix 1](#).

Overall, the key findings from this survey as applied to all 32 local authorities were:

- Direct clearance costs for litter alone were estimated to be £36 million per year
- Direct clearance and disposal costs for flytipped waste were estimated to be £8.9 million per year

Litter disposal was estimated to cost a further £1.5 million for local authorities, in the form of landfill fees and taxes⁴³. However, this cannot necessarily be counted as an additional cost of littering; local authorities also have to pay disposal costs for litter correctly deposited in public bins⁴⁴. In the case of flytipped waste, disposal costs for local authorities are included in the above figure; it is assumed the majority of the flytipped tonnage would not have been dealt with by the local authority if it had been legitimately disposed of⁴⁵. Legitimate disposal of both litter and flytipping might save additional money if material was recycled, as some material would command a market value. This is discussed at [section 4.5](#) below.

4.2.2 *The costs of clearance to other organisations*

We did not attempt to comprehensively quantify the costs of clearance to other organisations in Scotland. As with local authorities, in many cases costs for litter clearance are not separated from those for other waste management services. And unlike local authorities, other organisations have no reporting requirements around different waste types, and are frequently unaware of how much litter they clear.

Other public bodies

We surveyed a number of public bodies as part of the Eunomia survey. We focused on those who have responsibility for, or choose to undertake, litter or flytipping clearance on their land, including Transport Scotland, Scottish Canals, Scotland's two national parks, and the Forestry commission.

Counting just those organisations we spoke to that were able to quantify their spend, a further £700,000 of clean-up costs for litter and flytipping are borne by public land owners and land managers. The vast majority of this was associated with clean-up on the motorway network⁴⁶.

This estimate excludes the rail network (for which no figures were available), and other areas of the public sector estate likely to have to clear litter (e.g. schools and hospitals), and so should be considered a low end estimate, perhaps significantly so.

Other sites and enterprises

We also spoke to a small selection of other organisations. A very small number were able to isolate costs for litter clearance. It is not possible to build a national picture from such a small sample; however the responses are sufficient to highlight that substantial clearance costs are borne by a range of businesses and organisations. Example costs included:

- Edinburgh Airport suggested litter picking costs of around £25,000 per year⁴⁷. If this was assumed to be linked to passenger numbers, then for the three biggest Scottish airports the cost could be over £50,000⁴⁸. However this is not a well evidenced assumption, and this figure should be treated as indicative.
- The University of Edinburgh suggested costs of around £65,000 per year, with additional costs likely at the time of the Edinburgh Festival⁴⁹. If this was true of other Scottish



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universities, on a per student basis, then a national figure would be over £500,000⁵⁰, though it seems likely that Edinburgh, with a city centre location, might bear somewhat higher costs than average.

- Blair Drummond Safari Park suggested costs might be in the region of £10,000 a year⁵¹. It is likely other tourist attractions with high footfall will also be investing in litter clearance, but the actual amount is likely to vary significantly, based on the nature of the site, and we make no further extrapolation.
- McDonald's restaurants undertake litter picks near their outlets two to three times a day, which would have an estimated cost across all Scottish outlets of £400,000 each year, with additional patrols at 24 hour venues perhaps costing a further £38,000. This excludes on-premises cleaning⁵². McDonald's commitment to off premises litter clearance is not typical of fast food outlets more generally, so no extrapolation can be made.

Costs for just these four organisations, and excluding extrapolation to similar sites, are well over £500,000. While these are all large organisations, and may be atypical in some respects, it seems reasonable to conclude that the costs for Scotland as a whole would be counted in millions of pounds, though a more exact estimate cannot be made at this time.

Voluntary clean ups

Two high profile voluntary clean-ups in Scotland are Beachwatch, organized by the Marine Conservation Society, and National Spring Clean (now Clean Up Scotland), organised by Keep Scotland Beautiful. Direct spend on these by the sponsoring organisations concerned undoubtedly contributes to cleaning up Scotland. For Beachwatch the Scottish figure can be calculated as £16,500⁵³. Keep Scotland Beautiful expenditure is included under education and awareness activity in section 4.3, though some will relate to clean-up activity.

In addition to organisational costs, volunteer time should also be valued, as it has effectively been donated. In the case of Beachwatch this would be over £5000 (using conservative assumptions)⁵⁴. Considering just registered adult volunteers in National Spring Clean would give a value of time donated at £217,516⁵⁵. Outwith these organised national events, community groups and individuals undertake additional litter-picking activities, but no estimates exist for the frequency with which these occur.

Depending on funding models, some of the organisational costs above may in fact be met by organisations counted elsewhere in this research, or from government. These may therefore not be wholly additional to other identified spend.

In conclusion, voluntary clean ups contribute the equivalent of at least £230,000 each year to the process of cleaning up Scotland (without seeking to quantify their wider benefits to communities, which is likely to be considerable). This includes just two high profile events, and thus represents an underestimate.

4.3 Other direct costs of tackling litter and flytipping

Significant amounts of time and resources are also already invested in enforcement activity (the focus of [section 5.4](#)) and education and awareness raising (the focus of [section 5.2](#)) around litter and flytipping. Costs for both were also identified in the Eunomia survey. These included:

Enforcement and deterrence costs

Local authorities spend:

- £4.5 million a year on litter enforcement and deterrence activity
- £2.0 million a year on flytipping enforcement

Other bodies surveyed are seldom involved in litter and flytipping enforcement activity.

However, where enforcement extends beyond the scope of local authorities, and involves the Crown Office and Procurator Fiscal Service (COPFS), or Scottish Court Service, additional costs will be incurred. The total number of littering and flytipping charges⁵⁶ reported to the Crown Office and Procurator Fiscal Service was 2,277 in 2011/12⁵⁷. The exact time spent by COPFS processing these offences is not easily isolated. However, they are normally relatively straightforward to process and therefore typically require a relatively short amount of decision making time. Only a small amount of litter cases progress as far as the courts as a Fiscal Fine is often the penalty in the first instance. The time spent by the Scottish Court Service in collecting or enforcing such Fiscal Fines, or fines imposed by the court, is also not easily isolated.

Large scale and serial flytipping offences are likely to be dealt with as serious waste crimes, by either SEPA, or the police. This is likely to represent a significant investment of time and resources, and the costs of prosecution and trial may also be significant in these cases. This study has not sought to identify this spend, but it would be additional to the enforcement spend identified above.

Education and awareness raising

The Eunomia survey identified local authority spend on education and awareness raising activity of £0.86 million for litter and flytipping (with the vast majority relating to litter).

A number of other organisations identified spend of around £0.83 million per year relating to education and awareness activity for litter and flytipping combined. These include Zero Waste Scotland, Keep Scotland Beautiful, Scotland's two national parks and the Forestry Commission. As a proportion of this relates to support for community clean-ups, it also represents expenditure on direct clean-up. Due to differing funding models, this amount may include contributions from other organisations already counted above, such as local authorities, and also represents government grant funding.

In total then, expenditure on education and awareness is likely to be at least £1.7 million though the categorisation of some of this activity is not clear cut. It also seems likely other organisations will incur significant educational and awareness raising costs, ranging from the simple provision of signage, to school projects, or community activity. The picture of costs in this category presented here is therefore not considered to be comprehensive.



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4.4 Hidden and indirect costs

The financial burden of litter and flytipping extends far beyond clear up costs⁵⁸. These hidden costs are many and varied. They are also very hard to calculate, with litter often one of many contributing factors. As an example, the presence of litter has been shown in a number of studies overseas to encourage crime. But litter will not be the only (or indeed major) factor influencing this behaviour⁵⁹. And translating results from other countries to Scotland is not always straightforward⁶⁰.



Images 14-15: Litter and flytipping may combine with other factors (such as graffiti or vandalism) to lower local environmental quality and make areas appear uncared for. In turn this can lead to more serious impacts, such as an increased likelihood of crime, and a deterioration in residents' quality of life

The Eunomia study on indirect costs highlights that litter and flytipping impose significant costs on Scotland, and gives greater detail on the headline findings summarised here. While there is uncertainty around some of these numbers⁶¹, even the most conservative estimates for several of the issue areas identified are very large. This section highlights some of the most significant hidden costs of litter and flytipping identified in the Eunomia study. A discussion of how they can be compared, and what the total might be, is in [section 4.6](#), as it is not appropriate to simply add them up, since some estimates overlap, or have significant uncertainty associated with them.

These figures and issue areas identified should be seen as initial estimates, and the starting point for a conversation around the hidden costs of litter and flytipping in Scotland, rather than a final itemised account. This section summarises “internalised” indirect costs – those for which someone is already paying, though in practice, the wider impacts of some issues (e.g. crime and mental health) may include social disamenity, and thus not be wholly “internalised” at present.

The biggest item related to public expenditure identified in the study was the potential impact on mental health. Mental health care is expensive, and the economic burdens it imposes are extensive⁶². Local environmental quality, of which litter is an important element, can be a contributory factor in cases of depression⁶³. The Eunomia study suggested litter might be a contributory factor to around £10.7 million of total costs (0.1% of all mental health costs) in their low end estimate⁶⁴. Whilst the extent to which litter contributes to the overall problem can only be assigned qualitatively on the evidence currently available, the Eunomia researchers considered that a higher figure of around £50 million might be appropriate⁶⁵. Uncertainty in this area is high, and there is no suggestion litter is solely responsible for the impacts identified. However, better understanding

the linkages between litter, wider local environmental quality, and mental health would improve understanding further.

Little evidence was found of litter causing direct injuries (though this is a common public concern⁶⁶) and so no costs were identified for injuries or illness resulting from litter and flytipped waste in Scotland⁶⁷.

Crime was the next biggest issue area identified⁶⁸, and there is a relatively strong body of evidence associated with it. Studies show that high levels of litter (again, usually in the context of poor overall environmental quality) can encourage more serious crimes, though evidence largely comes from abroad⁶⁹. A study in the US quantified this impact, by tackling litter and other local environmental quality issues (such as graffiti) in specific neighbourhoods⁷⁰. If similar circumstances prevailed in Scotland, then the cost in police time (of crimes where a littered environment has contributed to the commission of a crime) is estimated between £43,000 and £4.3 million⁷¹. The wider impacts of the crimes in question would be between £225,000 and £22.5 million⁷². The Eunomia research team's qualitative assessment of the evidence suggests the most likely figure is over £11 million⁷³. It should be emphasized these are not the costs of dealing with litter as an offence, but those cases where a littered environment has encouraged other offences.

Wildfires were also identified as a probable indirect cost⁷⁴ (cigarette ends are an obvious cause for fires, though other littered waste can also provide ready fuel). The likely impact was identified to be between £66,000 and £6.6m, with the research team's qualitative assessment suggesting the most likely figure to be £1m, though evidence is relatively limited for this issue⁷⁵.

Other costs are also worthy of note. The study identified that litter may cause road accidents, with associated costs of between £1.0 million and £4.8 million (with the most likely figure identified at the low end of this range)⁷⁶. It could also be associated with punctures worth between £465,000 and £4.65m each year (with the most likely figure identified as £1 million)⁷⁷. In both cases, it is not obvious from available figures the extent to which incidents in Scotland are the result of "litter" or other objects in the road⁷⁸.

There is less evidence costing wildlife impacts than expected, though this does not mean negative impacts from litter are not realised in this area. A single study in Shetland identified £215,000 of costs associated with injuries to cattle (the causal factor was largely marine plastic litter blown ashore)⁷⁹. However, scaling this to Scotland as a whole (and also acknowledging much of the litter in question will originate outwith Scotland) is not possible. The study also suggested at least £100,000 may be spent in Scotland on rescuing animals caught in litter (with the specific example of swans caught in fishing tackle)⁸⁰. Whilst there is evidence of litter causing damage to other wildlife (especially marine life), this does not impose a financial costs as such, and insufficient evidence was available to place a value on this kind of damage⁸¹. However, it may well be that in estimating the value of clean beaches (see section 4.1) Scots themselves are factoring in the value to the population of preserving marine wildlife⁸². Marine litter is the focus of Feature Box 2.



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Other possible impacts were those of damage from vermin (pigeons and rats) where these are encouraged by litter (specifically food). Robust evidence on vermin numbers, the extent to which litter encourages them, and the number of incidents they are responsible for is hard to come by⁸³. However, rodents especially can do large amounts of damage (e.g. to cabling) and the cost of vermin control can also be significant. The study suggests combined costs may be in the region of £1.3 million but again, uncertainty is high⁸⁴.

A final significant area looked at for this study was the potential for litter to impact house prices⁸⁵. Taking a low end estimate of the possible effect of litter on house prices (where it can affect both the valuer's and buyer's perception), and assuming this might apply to just 1% of Scotland's housing stock, still gave a very significant cumulative figure of £100 million⁸⁶. The Eunomia research team believes this figure should be treated with caution in the Scottish context⁸⁷. However, even if the impact on Scottish house prices is a fraction of the initial estimate, it would still be a figure counted in millions.

Little evidence was found to put a cost against some frequently identified indirect costs impacts of litter and flytipping. This may imply these costs are less than anticipated; that they have been insufficiently studied to date; or it may simply imply that they are very hard to measure. For example, whilst there is strong evidence that tourists will avoid specific places – such as beaches – that are heavily littered⁸⁸, and that this can have a significant local economic impact, in most cases visitors seem likely to go to other destinations in the same locale, perhaps even an alternative beach location nearby⁸⁹. However, as already discussed, the value Scots themselves put on having clean beaches to enjoy is high – between £50 million and £100 million. And the fact that perceptions of littering could impact a specific sector (such as marine and coastal tourism) specifically certainly cannot be discounted, though no evidence was found to indicate this was occurring⁹⁰.

There is no evidence of overseas visitors to Scotland being put off returning by litter, though beauty is clearly one of Scotland's selling points, and Scotland's landscape and scenery are the number one reason for coming cited by visitors⁹¹. Thus anything that might reduce – or enhance – the perception of Scotland's visual appearance may be worthy of consideration. Given the large value of Scotland's tourist market (directly supporting just under 186,000 jobs⁹² and worth £4.3 billion in terms of overnight expenditure⁹³), and the evident value Scots themselves place on a litter free environment, more research might be justified, though separating the impact of litter from other factors, even if it was making a difference, might be extremely hard on a national scale. Moreover, in estimating potential impacts it should be remembered that any impact would depend on the relative levels of littering in Scotland as opposed to other countries. There is no robust international comparison for this. Understanding localised impacts of litter on tourism might be of much greater interest, particularly for communities that are affected⁹⁴.

The contribution litter can make to surface water flooding was also identified as a potential concern at the start of the research, but no evidence could be found to substantiate the extent to which this actually takes place⁹⁵. A potential link between flooding has been identified elsewhere as of relevance to coastal defences⁹⁶, so it may be this issue would merit further investigation.

Marine litter was not a focus of the Eunomia study, and Marine Scotland is developing a strategy specifically to address this issue. However, it is relevant to consider this issue in conjunction with that of land based litter, and this is the focus of Feature Box 2.



Image 16: Evidence from overseas suggests litter may lead to tourists choosing another location, but that this will often be nearby.

Feature Box 2: Marine litter

Marine litter is defined in more detail than land based litter as: “any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. Marine litter consists of items that have been made or used by people and deliberately discarded into the sea or rivers or on beaches; brought indirectly to the sea with rivers, sewage, storm water or winds; accidentally lost, including material lost at sea in bad weather (fishing gear, cargo); or deliberately left by people on beaches and shores”⁹⁷.

In contrast, the majority of this report focuses on terrestrial litter in Scotland, including inland waterways, and beaches, and focuses on countermeasures accordingly. Marine Scotland is developing a strategy tackling marine litter specifically. But there is significant overlap, with waste in the oceans washed up on Scotland's beaches, and waste from Scotland's shores ending up at sea.

The sources of marine litter are from both land and sea based activities; estimated at the global scale the greatest proportion (up to 80% in some cases) is from land based sources, with similar proportions quoted for Scotland⁹⁸. In a 2012 study looking at UK beaches as a whole^{99,100}, 40% of items were judged to have originated from the general public, 14% from fishing, 5% from sewage related debris, 4% from shipping, and 1% from flytipping. 0.2% was classed as medical waste. The source of 36% of the waste could not be identified. The average number of items per kilometre surveyed was just over 2,000.

Losses from marine litter are social, economic and environmental¹⁰¹. Many of these social and economic costs are discussed elsewhere in this report (including clearance costs for Scottish local authorities, lost amenity for tourists and residents, and the impact on property values). A unique impact of marine litter is the potential economic impact on maritime activity with the impacts of propeller fouling or waste caught in fishing nets. Research commissioned by Marine Scotland calculates that marine litter costs at least £17m a year, but states this is almost certainly an underestimate, due to additional negative impacts from marine litter that cannot be robustly costed¹⁰². Of the £17m figure, it seems likely that at least £10m of the identified costs would be clearly additional to those identified elsewhere in the current study¹⁰³.



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However it is wildlife and environmental impacts that are perhaps most concerning on a global scale. Sea life can be affected either by ingesting or becoming entangled in waste, and there may also be longer term impacts on ecosystems¹⁰⁴. Globally it is estimated that 267 species are affected by marine litter including 86% of all sea turtle species, 44% of sea bird species, and 43% of marine mammal species¹⁰⁵. Not all marine litter is visible. Much recent work has focused on the environmental impacts of micro plastics – tiny plastic particles in the sea which can be ingested by wildlife¹⁰⁶.

This study is a starting point for understanding indirect litter costs to Scotland. It is clear that estimates for several areas could be further refined, with revisions to the numbers here – both up and down – likely in a bespoke study looking at a specific issue area. And several gaps in the available evidence were identified, which future research might help to fill.

It is also important to note that the costs identified here cannot necessarily be added up, as some estimates for issue areas may overlap. For example, the wider costs of crime may also include mental health impacts (e.g. fear of crime). And the public's valuation of social disamenity identified in section 4.1 might well be considered to overlap with both of these factors. Nonetheless in [section 4.6](#) we summarise and compare the various costs identified throughout section 4.

4.5 A zero waste society?

Scotland's Zero Waste Plan sets out a vision of a zero waste society, where the value of resources is recognised, we use (or re-use) them more efficiently, and where they are recycled rather than thrown away, retaining value in Scotland's economy. Litter and flytipping result in resources being wasted – even once rubbish on the ground has been cleared up, it is typically dirty mixed waste, and recycle within it is not separable or of poor quality. Almost all of it ends up in landfill.

4.5.1 The value of recycle in litter and flytipped waste

[Section 3.1.2](#) identified that 52% of the litter stream is widely recyclable, with another 34% potentially recyclable (though less commonly collected). If collected for recycling via a dedicated collection route, recyclable items in the litter stream would, at current market prices, be worth over £1.2 million¹⁰⁷, though this might underestimate wider economic benefits from material capture. It is worth noting that the Eunomia study felt that a more realistic material value would be £0.6 million (representing 50% capture of material for recycling)¹⁰⁸.

Notably valuable materials currently littered include be paper and card (worth over £330,000 if recycled), metal cans (worth over £360,000 if recycled) and plastic bottles (worth over £180,000 if recycled)¹⁰⁹.

These figures account for material values only, and not the costs of operating the recycling service to collect them. However, given the high costs of litter clearance, it seems highly likely that the cost of collecting a tonne of recycle would be significantly lower than the cost of cleaning up a tonne of litter, and that this would represent an additional saving.

Currently the vast majority of litter that is cleaned up is subsequently landfilled¹¹⁰, with local authorities having to pay landfill disposal fees and taxes for this. The cost of this was £1.5 million in 2011 (see [section 4.2](#)). Every tonne of litter that is recycled instead reduces this figure. Though there might be handling fees associated with recycle streams, these are typically lower than landfill costs.

Essentially the savings above come not from litter avoidance, but from improved recycling performance. Where litter is diverted “from the ground” into public residual waste bins, these savings would not be realised. However, savings in clean-up and handling costs would still be very significant, as identified in [section 4.2](#).

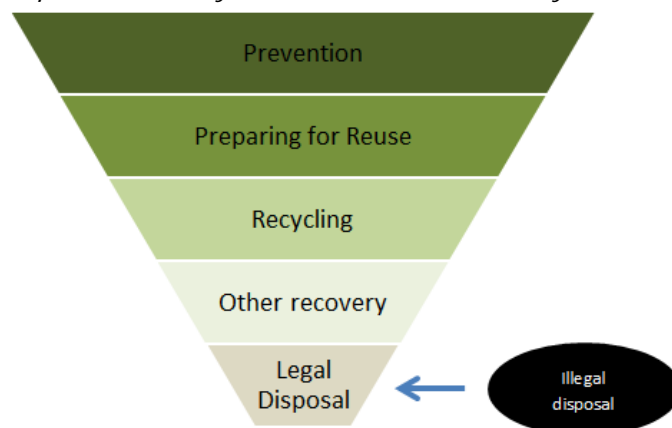
The value of flytipped waste is harder to calculate, as detail on its composition is not known. There is however likely to be material in this stream which can be recycled (with some local authorities already seeking to extract this to reduce their costs). And many flytipped items such as furniture or fridges might also have been suitable for reuse and repair had they been legitimately disposed of.

4.5.2 Managing resources responsibly

In addition to the pure financial value of materials in the litter stream there is a wider point. A society in which litter and flytipping are widespread is not yet a true zero waste society, either in its actions, or in the way we think about waste.

Responsible resource management is governed by the waste hierarchy, which identifies the preferred management solution for resources¹¹¹. Illegal disposal streams sit outwith the hierarchy altogether. The aim of anti-litter and anti-flytipping initiatives is to move waste into legitimate waste management routes, where the most environmentally friendly and economically beneficial management methods can then be selected.

Diagram 5: Illegal disposal sits wholly outwith the waste hierarchy



A greener more sustainable Scotland is one where individuals, communities, businesses, local authorities and central government recognise both the value of resources and the value of their environment. Litter and flytipping play no part in such a future.



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4.6 Summary: Adding it all up

Litter imposes social, economic and environmental burdens on Scotland. The nature of these costs is varied. Some are direct and obvious (such as clearance or enforcement). Others are hidden, but also impose a financial burden (such as costs from increased crime, fires, or to the NHS). And others are abstract (such as social disamenity) because no one currently pays for the damage or unhappiness caused.

Adding them together groups a large number of disparate categories. Additionally, many of these costs might be considered overlapping. And some might argue that Scotland's environment, or a community's quality of life, is priceless, and should not be valued in this way.

Nonetheless to understand the true scale of what litter costs Scotland, it is helpful to summarise what we know, and to compare these figures side by side.

Clearance costs are the most concrete and direct, and can be estimated with the highest confidence.

- Local authorities spend £45 million a year on clearance (£36 million for litter and £8.9 million for flytipping).
- At least a further £0.7 million is spent on clear-up (£0.6 million for litter and £0.1 million for flytipping) by the small selection of national public bodies we surveyed.
- The amount spent by other organisations, including private sector spend, is not systematically quantified in this study. However, on the available evidence, it seems highly likely to be counted in millions of pounds.

At least £46 million of public money is spent clearing up waste in the wrong place. Private sector spend cannot be robustly estimated.

Local authority spend on enforcement and deterrence can also be estimated with high levels of confidence, at £6.5 million (£4.5 million for litter and £2.0 million for flytipping). There are some additional costs to the Crown Office and Procurator Fiscal Service, and to the Scottish Courts service, which are not counted here. There will also be additional (and significant) costs for SEPA and the police where large scale flytipping incidents are involved, and prosecutions will also cost much more in these cases. This has not been estimated for this study. No private sector spend on enforcement has been identified¹¹². **At least £6.5 million of public money is spent on enforcement, and this is known to exclude SEPA and police spend on flytipping offences, as well as costs of prosecution through the courts.**

This study identified the following spend on education and awareness:

- £0.89 million by local authorities
- £0.83 million by other organisations (covering a variety of funding streams)

At least £1.7 million is spent on education and awareness raising. This may not capture all appropriate activity, and is probably a low end estimate.

In total this study identified over £53 million a year in current public spend on direct costs (clearance, education and enforcement activity).

The value of resources in the litter stream can be estimated with reasonable confidence to be at least £1.2 million a year at current market prices. Recycling these resources would also save an additional £1.5 million in landfill disposal fees and taxes. These values will not be realised by anti-litter measures in isolation; they are also dependent on material being

diverted into recycling collections. It has not been possible to obtain robust compositional data on flytipped waste, so no estimate is made for resource value for this waste stream.

Confidence around indirect costs is much lower. The table below shows the range of costs identified for different issues by the Eunomia study, with the range also giving a good sense of the uncertainty around the numbers. Additionally, as Eunomia highlight, some of these categories may double count. As an example, crime caused by litter may have long run impacts on victims sense of wellbeing, and in valuing this it could be counted both as an impact of crime, and within the mental health category. Crime might also impact, say, house prices. Even more importantly, with some of these issues, we are seeking to identify the probable contribution of litter and flytipping as part of a wider problem (usually poor local environmental quality). Solving the litter problem in isolation would not necessarily make all these associated costs go away.

Table 1: Estimates of Internalised Indirect Costs of Litter and Flytipping in Scotland¹¹³

Issue	Low end estimate	High end estimate	Preferred estimate
Crime <i>Of which police time</i>	£0.25m <i>£0.04m</i>	£23.0m <i>£4.3m</i>	Over £11m <i>Over £3m</i>
Mental wellbeing <i>Of which anti-depressants</i>	£10.7m <i>£0.03m</i>	£50m ¹¹⁴ <i>£3.1m</i>	Around £50m <i>Over £1m</i>
Road Accidents	£1.0m	£4.8m	Around £1.0m
Punctures	£0.46m	£4.7m	Around £1.0m
Damage to rail infrastructure	n/a	£0.05m	Around £0.05m
Vermin	£0.01m	£2.5m	Around £1.3m
Wildfires	£0.66m	£6.6m	Around £1m
Wildlife and livestock	£0.3m	n/a ¹¹⁵	At least £0.3m
House prices	n/a	£100m	Unknown ¹¹⁶

For the reasons identified above, the indirect costs cannot be directly added up, or simply assumed to be additional to the direct cost figures. **However, looking at the range of figures available, and the balance of evidence behind them, we conclude that indirect costs are likely to exceed £25 million¹¹⁷, and it is not unreasonable to suggest that they could equal or even exceed the direct costs (of around £50 million)¹¹⁸.** In assessing the likely size of hidden costs for Scotland, it should be remembered that the above table is not necessarily exhaustive. For example, the evidence on wildlife impacts is very limited. **Additional costs might reasonably be associated with marine litter – over £10 million of the total £17 million costs identified by Marine Scotland seem highly likely to be additional to the above estimate, and this would be a low end figure.** Much of this would however arise from waste originating from sources other than littering and flytipping in Scotland as defined in the majority of this study.

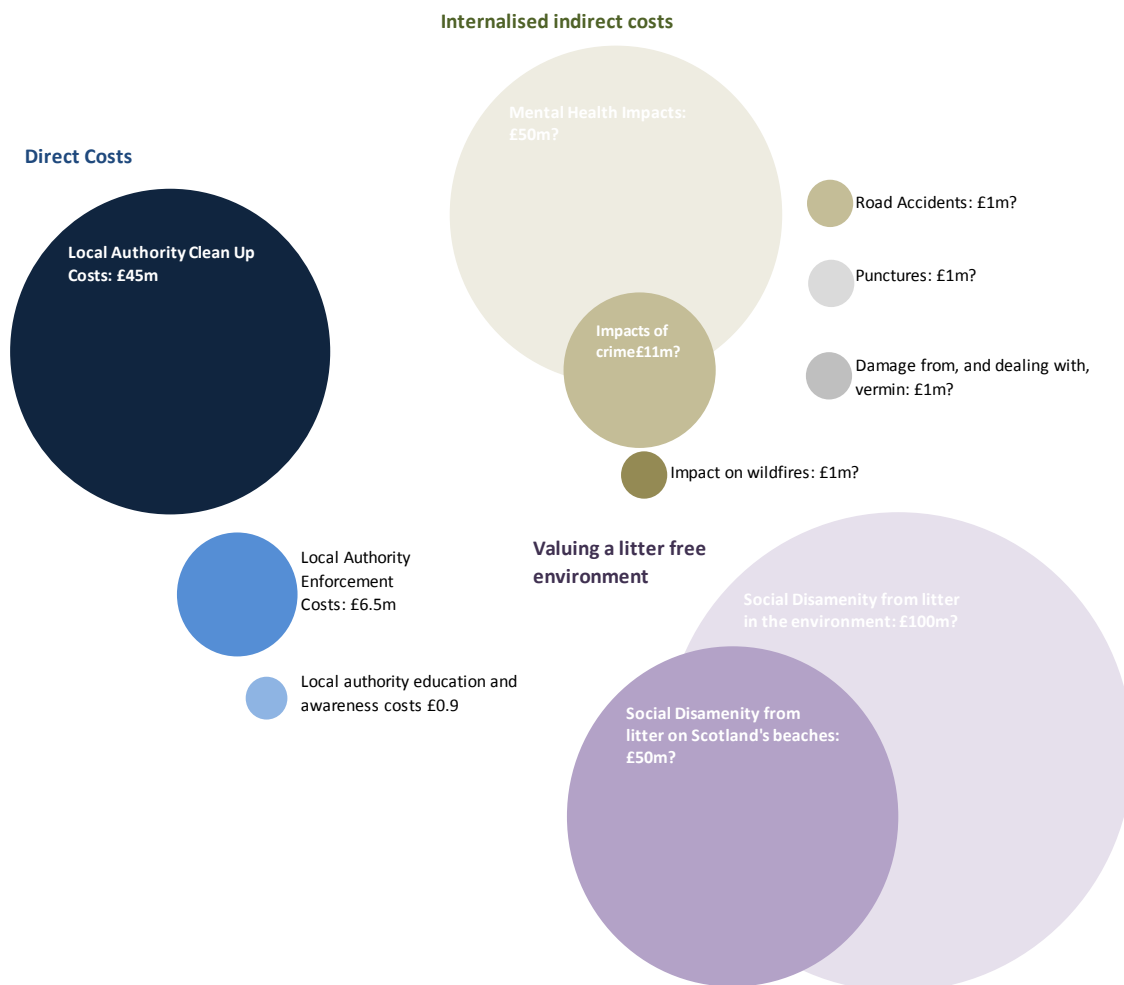
For illustrative purposes, a number of these direct and indirect costs are set side by side in the diagram below. It should be stressed again that they may not all represent discrete spend. The diagram shows the “most likely” figure for all categories above, but lower estimates for social disamenity (discussed below).



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The value Scots place on a litter free environment is perhaps the best indicator of what the size of this problem is, as, in theory, all the negative impacts are reflected in such an assessment. At the same time, it is perhaps the hardest to present here. By its very nature this figure is assumed to capture many of the costs identified above, and value their impact on the everyday lives of our citizens. Conservatively we suggest that Scots collectively would value litter free neighbourhoods at at least £73m. This is the very lowest figure in the Eunomia study, and their researchers believe the true value to be much higher (perhaps around £500 million). The value Scots place on clean beaches can be conservatively estimated to be at least £50m, and again, the Eunomia researchers believe the true figure to be higher. **Overall, a conservative estimate for the value Scots would place on a litter free environment would be at least £100m. This figure should not be added to those which precede it, as it may well factor in many of the costs already borne by society.**

Diagram 6: Selected direct and indirect costs from litter.



5 How can the problem be tackled?

In considering what causes littering and flytipping, and how they can be effectively prevented, it is important to consider the two issues quite distinctly. Littering is the result of small scale individual actions, sometimes deliberate, sometimes lazy or thoughtless. Flytipping in contrast is always likely to be premeditated, and is often more organised, or undertaken for (illegal) economic advantage. Thus in seeking to change behaviour, different approaches are required in the case of flytipping.

This section focuses primarily on littering behaviour, which was the focus of the review by Brook Lyndhurst, commissioned specifically for this report. Section 5.1 explains why we focus on influencing behaviour, and highlights what we know about the drivers for littering behaviour. It draws heavily on the Brook Lyndhurst review¹¹⁹, published alongside this report, which also informs subsequent sections. Subsequent sections consider the evidence on what measures can be taken to prevent littering (though some measures may also be appropriate for flytipping). Whilst each section deals with one theme – education and awareness, infrastructure and tools, and enforcement and deterrence – it is the case that an integrated approach may offer the best results. A final section focuses specifically on flytipping as a distinct issue.

5.1 What do we know about the causes of littering?

5.1.1 The importance of influencing behaviour

There are two ways of looking at the level of litter in Scotland: the rate of littering (i.e. behaviour), and the amount visible or present in the environment at any one time. The latter can be tackled solely by spending more on clean-up – but this is expensive, and potentially never-ending. Litter will generate the negative consequences identified in [section 4](#) in the meantime. And costs and the responsibility for keeping the environment clean fall on local authorities and other organisations, rather than on those causing the problem. Therefore, the long term solution to litter is by changing behaviour. The same applies to flytipping, though the measures needed to prevent occurrence are often somewhat different.

A helpful way to view efforts to change behaviour is via the “ISM” approach which considers individual, social, and material factors that can drive behaviour¹²⁰. The most effective behaviour change initiatives are likely to involve changes to all three. The Brook Lyndhurst review conducted to inform this study followed this ISM approach, although with the addition of “habits” as a specific category¹²¹, as this seemed quite central to littering behaviour.

Habit is placed with the “individual” category of the ISM model (though social influences on habits are also acknowledged to be significant), and this fits with what we know about littering behaviour too. However, as so much littering behaviour seems to be habitual and subconscious, looking at the reasons for this in greater detail seems justified for this issue area.



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5.1.2 Who litters?

This is an emotive question, and one that can lend itself to finger pointing, but the truth is that no single group or demographic are inherent “litterers”¹²². In fact around the half the population may have been responsible for some litter at some point¹²³. There are also many actions that do generate litter, but which some people may not classify as such (e.g. disposal of a banana skin, in the belief that it will rot naturally¹²⁴) or do not believe to be wrong (e.g. leaving items on a train in the expectation clearing them is the responsibility of others)¹²⁵.

In observations, people can be seen practising behaviour that results in litter, without actually throwing it on the ground (e.g. placing an item to one side with the intention to take it with them, but then “forgetting” it). And some behaviours seem simply odd – for example folding and tucking litter items into a crack in a wall, or posting them into a hedge¹²⁶.

While some groups do seem more likely to litter (the Brook Lyndhurst review highlighted evidence suggesting younger people are more likely to litter than older people¹²⁷, men are more likely to litter than women¹²⁸, and smokers are more likely to litter than non-smokers¹²⁹) who someone is is not necessarily the best guide to whether they will litter.

An alternative approach is to divide the population into groups, accounting for both demographic factors, and also attitude. A number of ways of doing this were highlighted in the Brook Lyndhurst study, and this provides useful insight into why people litter, discussed below, as well as as how different groups can be targetted in anti-litter interventions. More detail on the segmentation models themselves is available in the review.

However, one of the key findings from the Brook Lynhurst review is that it may be better to think about incidents of littering, rather than litterers¹³⁰. The same person may litter an item in one context, but be unlikely to do so in another. This fits with the ISM approach to understanding behaviour; clearly at present, people’s understanding of litter (both what it is, and how unacceptable it is) is highly context dependent. The item, the location, the presence or absence of bins, the company they are with – all of these will influence whether an individual litters an object or not.

It is also important to acknowledge that not all waste arising in our streets comes from littering behaviour. Accidents can happen (e.g. loads spilled from vehicles)¹³¹. And waste spilled during collections from households or commercial premises, or from overfilled bins, may also contribute (especially during windy weather)¹³². However, on the evidence from site assessments in Scotland (though these do not cover all areas or times where litter can arise), the general public were identified as the primary source of litter in 98% of sample areas¹³³. Just over 2% of sites were identified as affected by spillages from domestic waste collection¹³⁴. Public bins were found to be overfull (defined as more than three quarters capacity) in just 3.5% of cases when sites where they were located were assessed¹³⁵. It is however worth noting that where public services do result in litter, this may undermine anti-littering messages (see the discussion of social factors below) as it sends a contradictory signal about how importantly society views the problem.

In the Republic of Ireland, the origins of litter are broken down differently, but a similar picture emerges. “Passing pedestrians” were associated with 38% of cases, and “passing motorists” with 40%. Businesses were shown as contributing in more cases (10% of cases were associated with retail outlets, 6% with fast food outlets, 5% with entertainment and leisure venues, and 5% with schools). Specific venues such as ATMs (2% of cases) and bus stops (3%) were also identified¹³⁶.

However, in most of these cases too, it will be the public that is responsible for transferring the litter to the environment.



Images 17 - 18: Littering behaviour, and the reasons for it, vary from person to person and from location to location. It may be more helpful to try to understand types of littering incident, rather than see "litterers" as a specific type of person.

5.1.3 Why do people litter?

A number of factors were identified in the Brook Lyndhurst review as influencing littering behaviour. These are presented below in four categories, but there is significant overlap between them.

It is particularly important to note that not every littering incident is a wilful act. While some littering is conscious and deliberate, other incidents are habitual and unthinking. And in between, there are situations where individuals seem to consciously or subconsciously distance themselves from the act (e.g. the longer an item of rubbish is left beside someone on a bench, the more likely they are to walk away leaving it behind). However, the consequences of all these situations is no different.

Individual

- People's sense of responsibility for the space they are in (a shared sense of ownership or community is likely to reduce littering, while the sense "someone else" will clean up, or that no one cares for a space, is likely to increase it)¹³⁷
- People do not perceive all litter items equally (so, for example, smaller or biodegradable items may be thought not to "count")¹³⁸. There is also some evidence that a better understanding of the consequences of littering may reduce the likelihood people will litter¹³⁹.
- Laziness is frequently cited as a reason for littering; equally, the inconvenience of finding (or walking to) a bin is sometimes given¹⁴⁰.
- It also seems to be the case that most people know littering is wrong; simple prompts to associate an individual with the action (such as use of mirrors or signs at bins that trigger self-awareness) may reduce littering. The downside of this is that in some contexts, littering may be seen as "rebellious", or "cool"¹⁴¹.



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- People wish to be rid of rubbish as quickly as possible, and this “ick” factor seems to drive some littering behaviour¹⁴²
- A belief littering action cannot be seen by others may make it more likely; for example littering from vehicles seems to be closely linked to feelings of anonymity¹⁴³

Habitual

- There is significant evidence that in a large number of cases littering is not a deliberate or conscious act, but an unthinking reaction¹⁴⁴. This is likely to be the case for many of the influences cited in this section – most littering acts are not a careful weighing of the rights and wrongs of the act.
- Where this is the case, breaking habits, or even making people reflect on their own behaviour, may be important in generating change¹⁴⁵. Both the Brook Lyndhurst review and behaviour change literature more widely support the view that “moments of change” in life may lead to reflection and change of habits¹⁴⁶. More prosaically it suggests very focused messages (e.g. “bin your butts”) may be more effective than more generic “do not litter” messages, as the link to behaviour is more immediate¹⁴⁷.
- Other factors, not cited in the review but that might be expected to influence habits, might be communications efforts designed to raise awareness of the problem and encourage people to reflect on their own behaviour, or changes to infrastructure or the local environment prompting a reappraisal. With sub-conscious habitual behaviour, the role of “nudge” approaches might also be usefully explored¹⁴⁸.

Social

- Social expectations will influence behaviour. Social expectations are likely to be expressed in two ways. Firstly what people actually see – the behaviour of others, and the state of the local environment. Perhaps unsurprisingly, individuals are more likely to copy this than do something different. This means behaviour is likely to be context specific – linked to a particular place¹⁴⁹. If what people see conflicts with what they are told, then the effectiveness of anti-litter measures may be compromised: i.e. a simple sign saying “please don’t litter” is likely to be more effective in a clean environment¹⁵⁰. The second way people understand social expectations is however from what they are told. Thus messages and actions that send a clear signal littering is unacceptable, and generates very real negative consequences, can be effective in shaping behaviour¹⁵¹.
- Unsurprisingly, peer group, and to a lesser extent family, influences are considered important in shaping attitudes and behaviour, with littering behaviour potentially learnt from the example of others. This holds true for both general behaviour, and behaviour on a specific occasion; people are less likely to litter in “respectable” company (with parents, employers, in front of children)¹⁵².

Material

- Lack of bins is often given as a “reason” (or perhaps an excuse) for littering, and there is evidence to suggest that more, more convenient, bins can reduce litter¹⁵³. However this does not mean that more bins is always the solution. People may continue to use bins that are overflowing, rather than look for other nearby bins¹⁵⁴ and in observational studies people can be seen to litter in very close proximity to available facilities. Evidence on the influence of the location and frequency of bins, and levels of littering in the Brook Lyndhurst review was described as “mixed”¹⁵⁵.
- People are much more likely to litter in an already littered environment¹⁵⁶, which suggests clean-up efforts are important. This is both an effect of the descriptive norm described above, and perhaps a sense that additional littering will not make a difference. People’s

perception of whether an area is littered appears to have a historical element to it – even if a site is clean at a particular time of day, if people perceive it as “generally” littered, they may not modify their behaviour¹⁵⁷.

- Conversely, regular clean-up may make some people feel *less* responsibility for their litter, if they feel someone else will clean up after them. An example might be a large event or festival¹⁵⁸. It is perhaps important to consider how clean-up activity and non-littering messages interact, to ensure they do not send a contradictory signal.
- Other factors than litter alone will also affect behaviour – sites that have been vandalised, are dirty or run down, or otherwise appear uncared for, may generate more litter¹⁵⁹.
- People are broadly supportive of enforcement measures, but often express scepticism that perpetrators will be caught (see [section 4.2](#) below).

In moving on to think about how we can effect change, the individual, social, and material factors that influence behaviour should all be borne in mind, as should the ways in which they relate to habitual behaviour, and how reconsideration of habits can be prompted.



Image 19: Perceived anonymity may be a factor behind littering from vehicles.

5.2 Changing littering behaviour: Education and awareness

5.2.1 Evidence from outwith Scotland

Education and awareness activity can, and does, cover a wider range of activities. These include national and more localised campaigns (focused either on litter generally, or specific aspects of the problem in particular contexts), community engagement, and work in schools. The Brook Lyndhurst review highlights that people's understanding of what constitutes littering, which littered items “count” as litter, and the perception of how much wider society cares about litter are all key to



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individuals' behaviour, and are not, currently, necessarily as well understood as may be desirable. Additionally, evidence around enforcement and deterrence suggests that communicating enforcement is a key part of effective deterrence.

Most of the initiatives looked at in the Brook Lyndhurst review were large scale national or regional campaigns – this probably reflects the fact larger scale interventions are more likely to be written about¹⁶⁰. National campaigns often had a broad non-littering message, but with focuses on specific demographics (such as young people or smokers)¹⁶¹. A wide range of media channels have been used though these have typically been “passive”, in that they centred on providing information or advertising messages¹⁶². The Brook Lyndhurst review gives greater detail on messages that have proved successful – the evidence appears mixed on the relative effectiveness of “polite” and “forceful” messages; much would depend on context¹⁶³. Tools used as part of campaigns may address specific barriers to correct disposal (such as providing portable ashtrays for cigarette waste) or reinforce messages from peers (campaign materials displayed by others in the community)¹⁶⁴. Generally these campaigns reported an impact, but the measures and timescales concerned make it hard to draw robust conclusions across contexts¹⁶⁵.

The Brook Lyndhurst review also highlighted a number of studies which experimented with different triggers for littering and non-littering behaviour. These included:

- Feedback on the previous day's littering rates at a location, to encourage continual improvement¹⁶⁶
- Alternative infrastructure – such as new bins¹⁶⁷
- Prompting trailers in the cinema (to trigger or challenge specific behaviours)¹⁶⁸
- Mirrors over bins¹⁶⁹

Developing some of these into workable interventions for piloting in Scotland might offer some innovative interventions.



Images 20-21: Much littering behaviour may be habitual and unthinking. Changing behaviour means making people aware of what they are doing.

5.2.2 Scottish Experience to date

Several high profile national initiatives have been run by Keep Scotland Beautiful. In addition a wide range of education and awareness raising activity has been undertaken at local level. The practitioners involved generally consider local schemes to have been successful, but resources for

formal evaluation and write up for dissemination have been limited in many cases¹⁷⁰. In the past year Zero Waste Scotland's Litter Innovation Fund has supported nine projects with schools in Scotland, and one aim of the support is to better understand and communicate what can make local initiatives effective¹⁷¹.

Clean up campaigns such as Keep Scotland Beautiful's National Spring Clean (now Clean Up Scotland) have been very successful in engaging schools, communities, businesses and other organisations to take action to clean up and improve their local areas¹⁷². The Marine Conservation Society also support an annual clean-up operation by volunteers on Scotland's beaches, which doubles as a litter count¹⁷³. More localised clean-up activity has also been supported by Zero Waste Scotland's Flytipping Small Grants Scheme¹⁷⁴.

The main aim of a clear up is obviously an immediate improvement in environmental quality, and immediate localised effects are easily measured. More interesting when considering long term behaviour change is the potential legacy of such initiatives. As heavily littered areas can attract more litter, and a sense of pride in a location can reduce littering, it seems likely that legacy effects will occur following clean-ups in many contexts. Equally partnerships formed through these activities may lead to further action. However, the connection between clean-ups and long term behaviour change would benefit from further research.

Awards schemes such as Beautiful Scotland and It's Your Neighbourhood¹⁷⁵ may also help to grow community pride (and thus change values around littering as well as the likelihood someone litters), and again, further research linking these initiatives to evidence of long term behaviour change would be beneficial.

A large and varied range of education and awareness initiatives have been promoted through Keep Scotland Beautiful's People and Places programme which has been promoting a holistic approach to litter management and prevention since 1989. Recent entries into the People and Places awards included projects as diverse as cigarette litter campaigns, 'flashmobs'¹⁷⁶ involving young people to spread anti-litter messages, and a clean coast initiative¹⁷⁷. In more general terms, holistic approaches to tackling litter are discussed in more detail in the next section.

Litter is also one component of the popular Eco-Schools Programme¹⁷⁸, and the only component that is mandatory. However the emphasis given to litter will vary between schools, especially the extent to which they choose to engage with the issue of litter beyond the school gates.

Outwith Eco-Schools, individual education initiatives involving schools are fairly common, though resources to monitor the impact are often limited. Recent cases where monitoring has been a key part of initiatives include East Dunbartonshire, who sought to link engagement with schools with monitoring of cleanliness in target areas. Zero Waste Scotland funded nine schools initiatives in 2012/13, with reporting due later this year, so no conclusions can be drawn as yet¹⁷⁹. Findings should provide additional evidence on what works in the schools context.



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Education and engagement work is often more effective when delivered in partnership¹⁸⁰. Partnership working is discussed in greater detail in the next section.

5.3 Changing littering behaviour: Infrastructure and tools

This section covers a range of approaches including provision of hard infrastructure (i.e. bins), less tangible processes (e.g. measurement tools, or methods of engagement), and initiatives that may reduce the opportunity to litter.

5.3.1 Bin Provision

The most obvious anti-litter infrastructure is public bins. The Brook Lyndhurst review is clear that provision of litter bins can reduce littering¹⁸¹. However “more bins” is not necessarily the solution to the litter problem, and even where it is, it is not a service that is free. Servicing bins, particularly in remote rural locations (including many of Scotland's beauty spots), is expensive¹⁸². And a poorly serviced overflowing bin is as likely to generate litter as to reduce it if people are deterred from using it, or waste is added simply to spill onto the ground¹⁸³.

Scottish local authorities already provide tens of thousands of public litter bins¹⁸⁴. Both the Brook Lyndhurst review and practitioner experience is clear that these need to be of an appropriate size and in appropriate locations, regularly serviced, and cleanly and smartly presented¹⁸⁵. New technologies mean that bins can be increasingly smartly deployed and there is scope to improve knowledge in this area. Zero Waste Scotland is funding two projects in 2013¹⁸⁶ with precisely this objective.

Various opportunities exist to change bin design to make them consciously or subconsciously more appealing to users, though robust evidence on effectiveness in a Scottish context is lacking at present. These include novelty¹⁸⁷ bins, varying frequency or location of deployment, or features suggested noted in the Brook Lyndhurst review (e.g. mirrors – see above). Lessons from other contexts might be worth trialling with litter (e.g. in collecting charity donations, collection points at the top of an escalator may collect more money than those at the bottom, and it might be interesting to try a similar experiment with litter¹⁸⁸), and future work could look for transferable experience. In general, more evidence would be helpful in informing bin design and location, and technology does now exist to collect this more cheaply and reliably than ever before.

However bins are not the only answer. Bin provision is high in the vast majority of town centres and yet littering still occurs. And the correct balance between affordability, provision, and the scope for bins in rural locations (especially lay-bys) to have a negative impact and attract waste and generate litter and flytipping is a source of debate among Scottish practitioners. It is likely that poor bin infrastructure is as likely to generate a problem as to solve it.



Image 22: Poorly serviced bins do not help tackle litter, and may even be a source of it if they spill or overflow.

Though not primarily designed as anti-litter measures, Recycle on the Go schemes and Recycle and Reward Schemes may encourage more responsible disposal behaviour. They are the focus of Feature Box 3.

Feature Box 3: Do “Recycle on the Go” and “Recycle and Reward” schemes help to tackle littering?

Recycle and Reward is the name being used for a number of pilots currently being funded by Zero Waste Scotland. These involve either a deposit being paid when a container is purchased (with the deposit returned when the item is given back for recycling) or an incentive offered as a “thank you” when a recyclable container is returned. Recycle on the Go schemes offer public bins that separate key recyclable materials. A number of schemes have been introduced in Scotland in recent years (many of which have been supported with funding from Zero Waste Scotland).

The main aim of both Recycle on the Go and Recycle and Reward schemes is to improve capture rates of recyclate, and prevent valuable resources going to landfill. In the case of Recycle and Reward schemes in particular (where machinery or human agency is involved in the take-back of material) these schemes also offer a higher quality of recyclate, as only target materials are accepted, and segregation of materials is guaranteed.

Most material going into these schemes would previously have been disposed of in general waste bins (or other recycling systems), and would not have been litter on the ground. These schemes are primarily designed to help to encourage a recycling habit, rather than as anti-litter schemes as such. However, it has been suggested such schemes may also generate litter prevention effects.



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The impacts of these specific schemes on littering behaviour in Scotland are less well evidenced to date, as these initiatives are very recent¹⁸⁹. Clearly, where they represent additional facilities, then, like adding new waste bins, they may well discourage littering by making proper disposal easier.

Recycle and Reward schemes may additionally motivate proper disposal through provision of a direct incentive to individuals to dispose of items responsibly; the value of the item is higher for the individual, and should therefore be less likely to be thrown away. Scotland's Recycle and Reward schemes are still at a pilot stage. Several studies from elsewhere do however associate similar national schemes with litter reduction¹⁹⁰. It may also be the case that the prospect of a reward will influence individuals who are less responsive to anti-littering messages focused on social responsibility; however, robust evidence to support this hypothesis does not currently exist.

Both Recycle on the Go and Recycle and Reward schemes may also motivate disposal more than provision of general waste bins, if they are seen as more convenient (better or more visible locations), or more attractive (e.g. brighter colours, cleaner facilities). Again, evidence to support this hypothesis does not yet exist.

As with all on-street waste disposal provision, it is important Recycle on the Go facilities are well run and maintained; overflowing bins can increase the amount of waste on the ground, as well as frustrate potential users, and these factors could have a counterproductive effect on litter levels and littering behaviour (see section on bins).

5.3.2 Reducing opportunities to generate litter

It is also worth considering how we can change the context in which litter is generated, and perhaps reduce the opportunities to litter.

Producer responsibility could be usefully explored in the context of litter, on a localised or national basis. Businesses which sell 'on the go' food and drinks products, confectionary and cigarettes, have the potential to reduce the littering impact of their products and packaging through design changes. National and multinational companies such as McDonalds have taken steps to reduce their take away food and drinks packaging. They also display anti-litter messages on packaging to influence behaviour. Anecdotal evidence exists to show that small changes to packaging size and type (e.g. containers that fit more easily into bin apertures, or omitting a layer of secondary packaging) can minimize litter, though further research would be needed to support this more robustly. This might also result in reduced costs to businesses both in terms of packaging and (where they are responsible on or near their premises) clean-up, though again, further research might evidence this more robustly. Business award and recognition schemes, such as Keep Scotland Beautiful's Tidy Business Awards, can help to encourage corporate social responsibility for litter by rewarding and promoting best practice.

Carrier bag charging is often seen as a way to reduce carrier bag litter. In the Republic of Ireland the introduction of a charge is frequently associated with a drop in carrier bags in the litter count from 5% (in 2001) to, in 2010, 0.25%¹⁹¹. However, it is worth noting that the original level was an estimate, and the impact may in fact be less, depending on the accuracy of that original figure¹⁹². In an alternative measure, looking at the number of sites in which carrier bag litter occurs, and focused on the early years of the charge, a fall in sites with carrier bag litter was recorded between 2002 and 2003¹⁹³. It seems likely that the carrier bag levy in Ireland has reduced carrier bag litter, though perhaps by less than the headline figures suggest.

In Wales, which introduced a charge more recently in 2011, no tonnage data is available on litter impacts at present. However the number of carrier bags distributed has fallen significantly, which

might be expected to reduce their incidence as litter, all other things being equal. The public believe charging reduces litter. In a survey conducted in December 2012, 82% of Welsh people agreed or strongly agreed that the 5p carrier bag charge “helps reduce littering”. In Scotland, at the same time, 73% believed that a charge “would help reduce littering”¹⁹⁴.

5.3.3 Improving our knowledge

This research has also highlighted weaknesses in our current knowledge of litter and flytipping levels in Scotland. Local Authorities provide the data that we have, but as their focus is primarily on clean up, the approaches they take are not wholly consistent. Scotland's system for measuring street cleanliness is systematic and consistently applied; however it is not a measure of volumes, but rather of local authority service provision. At present it covers only those areas where local authorities have a duty to clean up, and is thus not a comprehensive picture of all areas.

Levels of litter and flytipping on private land are not centrally recorded at all, and very rarely understood by businesses or landowners themselves, even where better understanding might help them manage the problem more cheaply and efficiently. Better systems to allow other land managers, businesses, and individuals to report litter would both raise the profile of the issue, and help target efforts to tackle it. New technologies offer increasing opportunities to do so, particularly in the case of flytipping, which is discussed below in [section 5.5](#).

5.3.4 Delivering integrated solutions

Partnership approaches to litter and flytipping prevention were identified in the Brook Lyndhurst review as likely to improve outcomes across intervention types. The overall evidence on motivations for positive behaviour and barriers to correct behaviour also suggest that a mix of approaches (enforcement, education, and infrastructure) is likely to have a greater impact. Thus processes to deliver integrated solutions across a range of partners are likely to play an important part in effectively addressing both litter and flytipping.

A number of national collaborative bodies exist already in Scotland, including the Transport Litter Group (focused on the problem of litter on roads, waterways, and public transport) and the Scottish Flytipping Forum. Local authorities often act to coordinate action within local initiatives; for example an effective partnership for enforcement was established in North Lanarkshire in 2007, bringing together a range of services to establish the Environmental Warden service and working closely with external agencies such as the Police and SEPA. Localised partnership working has also led to positive outcomes in several anti-flytipping projects supported by Zero Waste Scotland's Flytipping Small Grants Scheme¹⁹⁵.

5.4 Influencing littering behaviour: Enforcement and deterrence

5.4.1 The concept of deterrence

In the UK nations as a whole, the idea of enforcement measures against littering is generally welcomed¹⁹⁶. However, research by Keep Scotland Beautiful in 2007 suggested scepticism about the



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effectiveness of current enforcement arrangements, with fines being seen as difficult to enforce, and the prospects of being caught seen as low¹⁹⁷.

This highlights that to be *effective* enforcement is in fact about deterrence. Deterrence is a result of both the penalty, and the perceived likelihood of getting caught (and being made to pay). The success of an enforcement regime is best measured by the extent to which it deters littering, rather than by the number of penalties handed out (although the latter may influence the former).

A focus on deterrence logically implies that a certain level of intensity may be required to make enforcement approaches effective (i.e. if resources are spread too thinly, the chances of getting caught in a specific context will be perceived as low¹⁹⁸). Thus, where resources are limited, they may be better deployed in a targeted location, or time period, so as to change expectations in a specific context. This matches current local authority resource deployment; those that have dedicated enforcement officers tend to concentrate them in town centres or around schools¹⁹⁹ (and these also tend to be areas of high footfall and thus litter generation).

There is some evidence deterrence works. Research in England by Keep Britain Tidy²⁰⁰, which showed relatively high levels of scepticism about the effectiveness of enforcement in general (with 49% considering litter fines not to be effective), also showed that those who had been issued a fine, or knew someone who had, were more likely to consider fines to be effective. The same also applied to those who had seen media stories about fines being issued. This suggests the profile of enforcement is important²⁰¹.

Research in Wales also supports the case that communications around fine levels and prosecutions may make deterrence more effective by increasing awareness of enforcement, and people's belief that they might get caught²⁰². It could also be suggested that a focus on deterrence may trigger a change in habits that could be self-sustaining after enforcement activity is scaled down, though at present no study has explored this. All this perhaps highlights that education and awareness activity, and deterrence, should not be seen as wholly distinct approaches. Each can perhaps support the effectiveness of the other.

Other views on enforcement from the 2007 focus groups in Scotland are perhaps also worth highlighting²⁰³. It was suggested that weak enforcement, or the perception that authority figures such as the police were inconsistent in tackling the issue, could send out a wider message that littering is not important (and thus undermine social norms, as discussed in [section 5.1](#)). Enforcement by local authorities (via posts such as "enforcement officers") need to be seen as credible authoritative position if they are to deter littering behaviour. And it was also suggested by the public that fines might be perceived as inappropriately targeted at occasional litterers (rather than persistent offenders) as these might be easier (and less intimidating) to catch²⁰⁴. There was also a misperception that local authorities could use fines as a revenue raising opportunity²⁰⁵. It is clear that while enforcement approaches receive broad support in the abstract, the way in which they are implemented is central to both their practical success, and their acceptability with the public.

However, the evidence does not wholly endorse the view that fines alone will generate long term behaviour change. Although based on a small sample, an English study which spoke to people who had been fined found that in many cases it had changed short term behaviour, but not underlying values²⁰⁶. There is also a suggestion that in some cases offenders were simply more "careful" about littering, and continued to do so surreptitiously²⁰⁷. The report authors conclude that an effective enforcement regime can make a difference, but that it needs to be linked to other measures²⁰⁸.

5.4.2 Existing enforcement powers

Actions against individuals

Scottish local authorities already have the power to issue fixed penalty notices (fines) to individuals who are caught in the act of littering²⁰⁹. In 2010/11 11,126 fixed penalty notices were issued²¹⁰. It is important to note that enforcement actions may not be the best measure of effective deterrence. For example the presence of a litter officer might be expected to reduce littering behaviour without any actual enforcement being required, though no study has tested this. And the way in which enforcement actions are communicated to the wider public may be as important in deterring future behaviour as the action itself as already referred to.

Scottish local authorities face a number of challenges in making deterrence effective. Feedback from local authorities in 2011²¹¹ highlighted a number of difficulties including:

- Non-payment of fixed penalty notices, with 48% unpaid in 2010/11
- The approach of the Crown Office and Procurator Fiscal Service (COPFS) in progressing unpaid fixed penalty notices has not always been consistent (it is worth noting that in 2012 COPFS restructured and now uses dedicated case marking teams in each of its three geographical federations)
- Littering from vehicles can be particularly difficult to evidence. In the course of this research programme, some local authorities suggested considering amendments to legislation to make the registered keeper of any vehicle from which littering takes place responsible for the offence (as is currently the case with flytipping). Whilst this would assist in ensuring such fines were paid, the detection of litter offences from vehicles, and of those occurring in more remote areas, would continue to be difficult.
- Extension of enforcement powers to other agencies might help to address this, as may targeted, high profile enforcement initiatives at litter hotspots²¹².
- In certain environments, especially late at night (when large amounts of littering occur) there are also health and safety concerns around the deployment of staff, for example when meeting the conditions of a Street Litter Control Notice (see below)
- Other challenges to enforcement identified included the difficulties of taking action against under 16s²¹³.

Enforcement is not a cheap option (see [section 4.3](#)), and can be resource intensive, especially where enforcement officers are employed, or cases need to be prosecuted. And where barriers to delivery of effective enforcement exist, these are likely to undermine its deterrent effect. Increasing payment of fixed penalty notices would not only reduce costs (by avoiding the need to take additional measures) but also have the potential to increase people's perception they will be made to pay (thus potentially increasing deterrent effects). Recent trials in England to encourage prompt payment of fixed penalty notices could suggest that there is value in exploring "nudge" approaches to maximise payment levels²¹⁴.

There are large variations in the number of officers employed to undertake enforcement duties across Scotland²¹⁵. The way in which they are deployed is also variable. Those in uniform may deter



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potential offenders (while in sight at least), and perhaps also reinforce an injunctive norm that littering is taken seriously, but those not in uniform are perhaps more likely to spot littering offences.

In England, Wales and Northern Ireland, additional enforcement powers are available. The Clean Neighbourhoods and Environment Act introduced an opportunity to increase the level of the littering fixed penalty fine, as well as powers in respect of landowners and flytippers, which are discussed below and in section 5.5

It may often be most effective to combine enforcement with other measures. As an example Zero Waste Scotland funded a small-scale initiative in 2012/13 which had an enforcement element. A key element of the project was communication relating both to the provision of new facilities and the effect of subsequent enforcement patrols. Possible learning from this scheme will be assessed in summer 2013.

Landowners and businesses

As an untidy environment can attract more litter, it is important that all landowners and businesses, and not just local authorities, work to keep neighbourhoods clean.

Scottish local authorities have the power to serve "Street Litter Control Notices"²¹⁶ (SLCNs) where a litter problem can be clearly traced to a specific business (e.g. a takeaway food premises). These make the owner responsible for keeping the front of the premises, plus a reasonable distance either side, clear of litter. "Litter Control Areas"²¹⁷ (LCAs) enable a local authority to impose a monitoring regime and clearance obligation on owners of designated²¹⁸ private land.

In both cases however, practitioners have reported that the processes required for enforcement are resource intensive and cumbersome²¹⁹, and these powers have not been widely used to date²²⁰. There is scope for local authorities to include the requirements of a Street Litter Control Notice when issuing licences to businesses like late night catering outlets and street traders. Practitioners have also called for an extension to the list of premises to which a SLCN applies, to include all premises (excluding domestic) where the activities of its business, staff or customers clearly contribute to nearby litter (including smoking litter).

In other UK nations, the powers of the Clean Environment and Neighbourhood Act enhance or replace these measures. There is a fixed penalty fine for non-compliance with a Street Litter Control Notice which simplifies the process of enforcement; and the difficulties inherent in applying a Litter Control Area to designated private land have been overcome by the provision of a Litter Clearance Notice, which can be applied to all non-local authority land.

5.5 Tackling flytipping

Whereas littering is the result of millions of single, often habitual or thoughtless actions, almost every incident of flytipping is premeditated and deliberate. For this reason, the measures required to change behaviour in this area are different in emphasis from those required for anti-littering initiatives. However, as has been seen in the references to flytipping in the preceding sections, some elements may be relevant to both issues.

Education and awareness

Education and awareness may have a lesser role to play in addressing flytipping. However, they are not wholly redundant. Some flytipping results from householders or small businesses passing their waste to an intermediary (potentially one posing as a legitimate service provider), without checking where the waste will end up²²¹. A better understanding of their responsibility to check that they are using a licenced waste carrier might reduce the extent to which this takes place, although evidence around this is unavailable²²².

Householders and businesses could also be better informed of how they can legitimately dispose of items such as bulky waste via local authority or charitable services. Local trials to improve services to date have not sought to measure flytipping impacts, though it would be something worth monitoring in future.

Communication of penalties and enforcement activity is likely to be important in generating a deterrent effect for small scale incidents, as it is with litter. Larger scale organised criminal operations seem unlikely to be deterred in this way – it is highly likely they are already well aware of what they are doing, and the potential consequences²²³.

Infrastructure and tools

The role of infrastructure in deterring flytipping is highly relevant. CCTV or barriers at known flytipping sites can prevent reoffending²²⁴, although the extent to which the problem may just be transferred should not be underestimated. Current data capture makes it hard to see where the problem is displaced rather than reduced by these measures, though new data systems will improve our understanding.

Crucially, better data is central to effectively tackling flytipping. By mapping where incidents occur, they become easier to clear up, to prevent in future, and to prosecute²²⁵. Flytipping maps can be matched to intelligence data held by SEPA or the police to track and catch persistent offenders. Zero Waste Scotland is supporting a trial of a new data capture system for flytipping in Scotland in 2013.

In 2011/12 and 2012/13 Zero Waste Scotland funded 43 projects, predominantly community led, to tackle localised incidents of chronic flytipping (see [section 6.4](#)). Such projects provide an opportunity to bring together local residents, landowners, local authorities and others to tackle this issue in a joined up way²²⁶.

The Scottish Flytipping Forum also supports the development of regional flytipping groups, which will provide further opportunities for partnership working, including the sharing of data and intelligence between enforcement agencies, private landowners and local communities affected by flytipping.



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Enforcement and deterrence

Enforcement is considered by practitioners to be central to tackling flytipping. Where flytipping results from highly organised criminal enterprise, other measures are likely to be ineffective. Enforcement can also be more directly effective than with littering (where the primary aim is deterrence). In the case of flytipping, removing a single serial perpetrator may have a disproportionate impact on commission of future crimes in a given location.

Enforcement measures in Scotland for small scale flytipping start with a fixed penalty notice; the considerations here might be similar to those around enforcement and deterrence for littering, as these will often be individual actions. The fixed penalty notice for flytipping is currently set at £50 (the same level as for littering offences). Local authorities have highlighted that this level should be raised to reflect the more serious and intentional nature of flytipping; to increase the deterrent effect; and to help to cover the costs incurred in subsequent clean-up of flytipping sites. At its current level the fixed penalty notice is also potentially too small to deter those providing an illegal waste collection "service", when compared to the potential profit.

More serious incidents of flytipping are therefore subject to a number of specific regulations. Under section 33 of the Environmental Protection Act perpetrators can face a maximum fine of £40,000 and or a custodial sentence. Section 34 of the same act places a 'duty of care' on anyone involved in the handling of waste (from production to final disposal) to ensure that it does not escape, and requiring that any transfer of the waste between parties is properly documented in a system of waste transfer notes. Some practitioners have suggested that stricter enforcement of section 34, which is essentially self-regulating, would also have the effect of reducing flytipping. Ideas include introducing a fixed penalty notice for any breach of duty of care requirements²²⁷. This would allow local authorities to take immediate action against, for example, a business that did not have an adequate trade waste service in place and which may be disposing of its waste illegally. It has also been suggested that tightening the waste carriers' licensing regime would help ensure that those carrying waste are doing so legitimately.



Image 23: Better information on the location and type of flytipping incidents can help investigations and prevent repeat offending at blackspots

6 What is already being done?

Much action is already being taken to control litter in Scotland – by government, local authorities, charities, community groups, and individuals. This section summarises this activity, without which the scale of Scotland's litter problem would be far larger²²⁸. In doing so, it touches on many of the initiatives that have already been referenced.

Over the course of 2013 the Scottish Government is developing a litter strategy to tackle the problem more effectively. This report is part of that process, and will inform strategy development and the design of future interventions.

6.1 Local authorities

Local authorities in Scotland already spend over £52 million a year on litter and flytipping (see [section 4](#)), the vast majority of which is on clean-up. The services they provide depends on the size and nature of the authority, but ranges from manual litter picking to road and pavement sweeping machines. Authorities are obligated to provide a certain standard of street cleanliness²²⁹, and the system in place to measure this has shown a steady improvement over time.

In addition to this, local authorities are the primary providers of infrastructure such as bins, enabling the public to dispose of waste responsibly. Local authority street cleansing services tackle not just litter, but also remove significant amounts of naturally occurring material that can also impact cleanliness (and thus attract litter) as well as block drains, and damage the road service.

Local authorities are also the main bodies currently likely to take action on enforcement. Local authorities are also empowered to act to ensure businesses behave responsibly where they are likely to be a source of littered materials.

Many also undertake education activity, with initiatives ranging from action to tackle chewing gum, smoking litter, school litter roadside litter and litter from businesses (primarily fast food outlets), and efforts to tackle "orphan" land (disused sites in private, and perhaps unknown, ownership, and where litter can often accumulate). Some have run high profile campaigns, while others have focused on more targeted initiatives.

Local authorities are also likely to lead where a partnership approach is taken. This includes participation at local, regional and national levels. Local authorities have brought littering to the attention of the police, business improvement districts, community and third sector organisations, and other landowners and duty bodies²³⁰. Several local authorities have been highly active participants on national bodies such as the Scottish Flytipping Forum, and the Transport Litter Group, where the Convention of Scottish Local Authorities (COSLA) are also represented. Local Authorities have been central in the Keep Scotland Beautiful and Zero Waste Scotland initiatives discussed below.

A small number of local authorities have also produced their own litter strategies or action plans, which not only provide an opportunity to inform the local population on what steps they are taking to



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manage and prevent litter and flytipping, but also to highlight partnerships with local schools, businesses, communities and other organisations in their area.

While national data on litter and flytipping in Scotland is far from perfect, the data we do have comes largely from local authorities.

Local authorities are very much in the front line in addressing Scotland's litter problem.

6.2 Keep Scotland Beautiful

Keep Scotland Beautiful works closely with local authorities, the public and other stakeholders to tackle a range of local environmental quality issues including litter and flytipping. Through a range of campaigns and programmes Keep Scotland Beautiful supports local action across Scotland.

Clean Up Scotland is a year-round campaign which aims to engage a million people in cleaning up litter and flytipping. The campaign builds on the success of National Spring Clean which has given a focus to community led clean-up activity for a number of years. The celebration element of Clean Up Scotland is the Beautiful Scotland Award scheme which rewards communities taking action to clean up, and green up their local areas.

Through the People and Places networking programme Keep Scotland Beautiful supports local authorities, private companies, operating companies and other duty bodies to deliver best practice in street cleansing, awareness raising and enforcement. The programme provides networking opportunities and enforcement training in addition to best practice information sharing.

Eco-Schools Scotland is also run by Keep Scotland Beautiful, and is a flagship sustainable education programme which engages all local authorities in Scotland.. With 98% of local authority schools registered, and litter being one component of the programme, and the only component that is mandatory, the programme aims to educate young people about their responsibilities in relation to their local environment."

Keep Scotland Beautiful administers three award schemes, two for beaches; the Seaside Award and the international Blue Flag; and the Green Flag for parks. All three awards include criteria to ensure that litter is managed responsibly and recycling is promoted where possible.

The Local Environment Audit Management System (LEAMS) was developed by Keep Scotland Beautiful with Scottish Government funding and a pilot group of local authorities to provide benchmarking information for the cleanliness of roads and streets in Scotland. From 2003 all local authorities signed up to take part in the first national collation of cleanliness standards and this continues to this day providing national information on graffiti, dog fouling, litter, who is causing the litter and what they are dropping, as well as a host of other environmental indicators. The system records the standards of 14% of all local authority streets annually and is a key performance indicator for all local authorities.

6.3 Other charities, community groups, and individuals

A wide range of charitable, voluntary and other community organisations are involved in tackling litter and flytipping in Scotland. Small scale organisations such as People Against Litter (PAL) and Aberdeenshire Litter Initiative (ALI)²³¹, and larger national bodies such as the Marine Conservation Society²³², recruit willing volunteers (on an individual or group basis) who help to record and clean up

litter from towns, parks and beaches across Scotland. A huge number of people have contributed directly to efforts to reduce litter in Scotland, many of whom will have participated in the Keep Scotland Beautiful initiatives mentioned above.

6.4 Zero Waste Scotland's litter and flytipping programme

Zero Waste Scotland's Litter and Flytipping Programme started in 2011, acknowledging that a society in which littering and flytipping are widespread is not a zero waste society. The programme is delivered in conjunction with a wide range of partners²³³.

One specific initiative is the Flytipping Prevention Small Grants Scheme, which provided small scale funding in 2011/12 and 2012/13, primarily to community organisations but also to a small number of private landowners and local authorities. Funded projects had to clearly demonstrate that they aimed not just to clean up chronic flytipping sites, but also that preventative measures – physical, educational or both – would also be put in place to prevent recurrence. The intention is to learn what works, as well as to generate improved local environmental quality for the communities concerned.

In 2012/13 Zero Waste Scotland launched a Litter Prevention Innovation Fund. Eleven projects were funded (with recipients including local authorities, a university, and two third sector organisations). Projects were designed to support local outcomes, but also to try new ideas, and generate evidence on initiatives that might be appropriate for wider roll out. This Fund will report later in the summer, with results further informing the government litter strategy.

This report is also a culmination of programme activity, not just in terms of research outputs, but also the stakeholder engagement and partnership building that has supported the process. The programme has also provided insight and expertise which will be built into a number of new anti-litter and anti-flytipping initiatives, including a transport litter week of action, work with Loch Lomond and the Trossachs National Park, and ongoing development of a potential new data capture system for Scottish flytipping incidents. Zero Waste Scotland will also play a key role in developing and rolling out the government's litter and flytipping strategy.

Beyond the sole scope of the litter and flytipping strategy, Zero Waste Scotland has also provided evidence to support Scottish government consultations on a plastic bag levy in Scotland, has funded significant roll outs of Recycle on the Go infrastructure, and is currently trialling Recycle and Reward schemes across Scotland. Though not solely anti-litter initiatives, the impact on litter of these measures may be significant. Zero Waste Scotland is also involved in trials at Scottish fishing ports to ensure that waste plastic (from fleets, or fished out of the sea) can be safely recycled.

6.5 Marine Scotland

Marine Scotland is currently developing a marine litter strategy, which aims to address litter affecting marine and coastal environments in and around Scotland (see also Feature Box 2).



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While the issues this addresses are somewhat distinct from the land-based focus of the measures discussed in this report, there are places where the two overlap (primarily where marine litter is washed up on shore, or where land-based litter is washed out to sea). While the majority of marine litter does ultimately originate on land, this does not necessarily mean that it originates in Scotland.

Work is being undertaken to ensure that the strategy reflects the wider zero waste agenda, and complements proposals for the national (terrestrial) litter and flytipping strategy.

6.6 Other organisations

In addition to local authorities, a number of other landowners and land managers in Scotland have to deal with litter and flytipping problems. Responsibility for keeping the motorway network clean lies with Transport Scotland and its contractors. Network Rail and ScotRail have responsibility for keeping railway tracks and stations clear of litter and other refuse, whilst Scottish Canals must deal with litter in canals, on towpaths and surrounding areas. Other organisations such as the Forestry Commission and the National Parks are also concerned with litter and flytipping. A number of these organisations are also involved in preventative work through the Transport Litter Group and other partnership initiatives.

This report has identified that many businesses also take on significant costs for clearance.

6.7 What happens next?

Scottish Government is in the process of developing a national litter strategy, which will also address flytipping. The aim is to achieve a clean, safe environment for people who live in and visit Scotland - where littering is no longer acceptable.

The Scottish Government is publishing a consultation paper in summer 2013 outlining proposed actions to tackle litter and flytipping and inviting feedback.

Following the consultation, the Scottish Government will publish a National Litter Strategy covering education, infrastructure and enforcement measures. These will encourage people to dispose of their rubbish responsibly, and support organisations with duties to remove litter. The approach will build on the Scottish Government's earlier investment through Zero Waste Scotland.

6.1 Scotland is a beautiful country – let's keep it that way

This report has of course focused on a negative, but this should not conceal another truth: Scotland has many immaculately presented historical monuments, some of the most beautiful landscapes and coastlines in the world, and attractive cities, towns and villages. Over 8 million tourists visit every year²³⁴. It's well worth making the most of this, both for ourselves, and for visitors. There's more we can do, but already local authorities, government, businesses, private organisations and individuals typically act responsibly to maintain and improve Scotland's appearance, for residents and visitors alike. Scotland is a beautiful country – let's keep it that way.

Appendix 1: Calculating litter volumes in Scotland

Estimating litter tonnages

For reasons explained in the main report, we focused on estimating the amount of litter cleaned up by local authorities. Scotland's national waste data system, WasteDataFlow has a category for tonnages arising from street cleansing. In practice, the tonnages reported under this category do not well match "litter on the ground" for several reasons.

The street cleansing category in some cases also includes material that is:

- "Gully waste" (primarily naturally occurring material, typically removed from roads by mechanical sweepers), though this can also be entered in a separate category
- Correctly disposed of in litter bins
- Is in fact flytipping

The street cleansing category can also exclude material:

- That is littered, but collected alongside other waste, and thus recorded in a different category
- That is separated from the litter stream by local authorities for subsequent recycling (in practice, this tonnage is mostly street sweepings, but it does add significant uncertainty).

In undertaking this research it was also identified that litter could be classed within other WasteDataFlow categories, especially "Gully Waste", "Grounds, Parks and Gardens", "Beach Cleansing", and "Highways".

Reporting practices vary across local authorities. For this reason, as part of the Eunomia survey of local authorities, we explored the above categories and how they were used in more detail. Based on responses, Eunomia estimated the overall tonnage as follows:

- "Street sweepings" data was modelled (based on population, and urban/rural classification) for local authorities where data was missing
- The element of street sweepings that was in fact likely to be "gully waste" (based on interview data) was deducted (usually around 60% of the total)
- The flytipping tonnages (see appendix 2) were also deducted, as the interviews showed many local authorities were also recording flytipping in this category
- The percentage of street sweepings that was estimated to be "on the ground" as opposed to in bins was applied (again, based on interview responses). This was typically around 44%.

For many local authorities, estimates of splits within the waste stream are indicative, rather than based on actual measured data; local authorities do not always measure the above factors in detail within their waste management processes. The other WasteDataFlow categories were excluded from further consideration, as investigation showed the litter element was typically very small.

A final area of uncertainty concerned the extent to which "gully waste" was recycled. If large amounts are being recycled, then the amount of gully waste to be deducted from the street cleansing total may vary too.



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Allowing for all these factors, Eunomia estimated "litter on the ground" to account for between 15,340t and 20,234t. The mid point estimate was therefore 17,787t.

In providing a final total for this report, a further adjustment was made. Composition data for the litter stream was taken from The Composition of Municipal Solid Waste in Scotland²³⁵. This (following the household waste categorisations used elsewhere in the report) reported "Garden waste", "other organics", and "fines", accounting for 5.9%, 5.1%, and 1.5% of the litter stream respectively. As it was judged that in the context of street cleansing these might well be naturally arising, they were also deducted before arriving at the total for litter on the ground given in this report of 15,886t. We have rounded this down to the nearest thousand to reflect the uncertainty associated with this estimate, and to ensure the final figure quoted is, if anything, conservative.

To summarise, the litter tonnage in this report reflects:

$$\begin{array}{ccccccc} \textit{Litter} & & \textit{Actual /} & & \textit{Non-} & & \textit{Flytipped} & & \textit{Bin litter} & & \textit{The fraction} \\ \textit{on the} & = & \textit{estimated} & - & \textit{recycled} & - & \textit{tonnages} & - & & - & \textit{of remaining} \\ \textit{ground} & & \textit{street} & & \textit{street} & & & & & & \textit{waste} \\ & & \textit{cleansing} & & \textit{sweepings} & & & & & & \textit{estimated to} \\ & & \textit{tonnages} & & & & & & & & \textit{be naturally} \\ & & & & & & & & & & \textit{arising} \end{array}$$

The Eunomia survey, and estimated direct costs

Eunomia sought interviews all 32 Scottish local authorities. Twelve authorities (accounting for 44% of Scotland's population, and a mix of urban and rural areas) had reasonably complete data, and a further ten authorities were able to provide partial information. However, cost breakdowns were not consistent across authorities (due to different operational practices, and potential different categorisations of similar activity). In many cases additional clarification was sought, and we would like to thank both Eunomia, and the local authorities concerned for their efforts.

Where data was not available, it has been modelled based on cases where responses were given, with population and the urban rural split accounted for. This modelling was typically conservative, and it is more likely spend has been excluded, rather than incorrectly counted via the approach taken.

The survey also covered a number of public bodies and other organisations with an interest in litter. These included Scotland's two national parks, Forestry Enterprise Scotland, Scottish Canals, Scotrail, Network Rail and Transport Scotland (who oversee the road network). Visit Scotland, Marine Scotland, and Keep Scotland Beautiful were also included, though these organisations are stakeholders rather than land managers.

Estimating the number of items in a tonne of litter

At its simplest, the estimate of 20,000 items per tonne simply assumes an average item weight of 50g – much heavier than most littered items (e.g. paper, cans, plastic bottles, crisp packets etc) though lighter than some (e.g. glass bottles).

We sense checked this by looking at the composition of an average tonne of litter, and assigning an average weight for an average item in each category. We typically chose a heavy item weight to make this more conservative (and because in the litter stream, some items will be heavier – for

example, a clean piece of A4 paper weighs around 5g, but we assumed 15g as the average weight of a "paper" piece of litter, as these are very unlikely to be clean and dry). Categories where assigning an average weight was not possible were simply excluded in this approach. This approach (which excluded some tonnage as described) gave an item count of just over 21,000 items per tonne.

If anything, it is likely our item estimate is low. However it is intended to convey the scale of the problem, and focusing on visible items perhaps gives the best sense of the diffuse but highly noticeable character of littered waste.

In scaling our item estimate to Scotland as a whole we have been a little more cautious, acknowledging that there may be some larger bulky items recorded in the waste data that are poorly reflected in compositional studies. We have therefore quoted 250 million items as our annual total (rather than 300 million, which would be the estimate arrived at simply by multiplying the litter tonnage estimate by the estimated number of items in a tonne).

Estimating the recyclable element of the litter stream

For each of the categories in the 2009 compositional study we considered if the item should be classed as "widely recycled", "potentially recyclable" or "not generally recycled at present". We took as our starting point a recent study of commercial and industrial waste in Scotland²³⁶ where a similar set of assumptions were made, but we also referred this to our project steering group to check that it made sense in the context of litter. Following this, materials were grouped as follows:

Table 2: Categorisation of littered materials by the extent to which they are recyclable

Material Category	Estimated % Composition in Litter on the ground	Recyclable?
Newspapers & magazines	8.5%	Widely
Other paper	8.2%	Widely
Cardboard	9.2%	Widely
Plastic film	6.6%	Potentially
Plastic bottles	8.6%	Widely
Other plastic packaging	4.0%	Potentially
Other dense plastic	1.2%	Potentially
Textiles & footwear	2.1%	Potentially
Wood	0.7%	Potentially
Furniture	0.6%	Potentially
Disposable nappies	1.6%	Potentially
Other Combustibles	11.2%	No
Packaging glass	9.1%	Widely
Other glass	0.3%	Potentially
Rubble (C&D waste)	0.2%	No
Other non-combustibles	0.7%	No



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Metal cans	4.0%	Widely
Other metal	2.9%	Potentially
Food/kitchen waste	14.3%	Potentially
HHW	0.1%	No
WEEE	4.0%	Widely
Fines	1.7%	No

The categorisation above reflects the recyclability of materials if they were not littered and were instead recycled in an appropriate facility. In the course of this research it was also highlighted that some materials can be extracted for recycling from the litter stream by post-sorting waste. In this case, the categorisation of recoverable material would be different.

Food waste is increasingly “widely” recycled, but is perhaps relatively unlikely to be carried to a suitable recycling location when generated “out and about”.

Valuing the material discarded in the litter stream

We took the material composition split shown in table 2 above, and applied it to our estimated total litter tonnage of 15,886t. We assumed material values as per the Eunomia study on indirect costs²³⁷, which were in turn based on 2011 prices.

In contrast to the Eunomia study, we have applied these values to all material in the litter stream, whereas their calculation is based on 50% recovery.

It is worth noting that this approach only assigns “value” where materials command a positive market price. In practice, many other materials may have economic value for the economy as a whole (e.g. food waste can be recovered at AD plants to generate electricity, and provide compost and fertiliser). However, the valuation here reflects the fact that a local authority still has to pay a fee to dispose of many materials to a reprocessor.

Estimating Changes in Litter Over Time

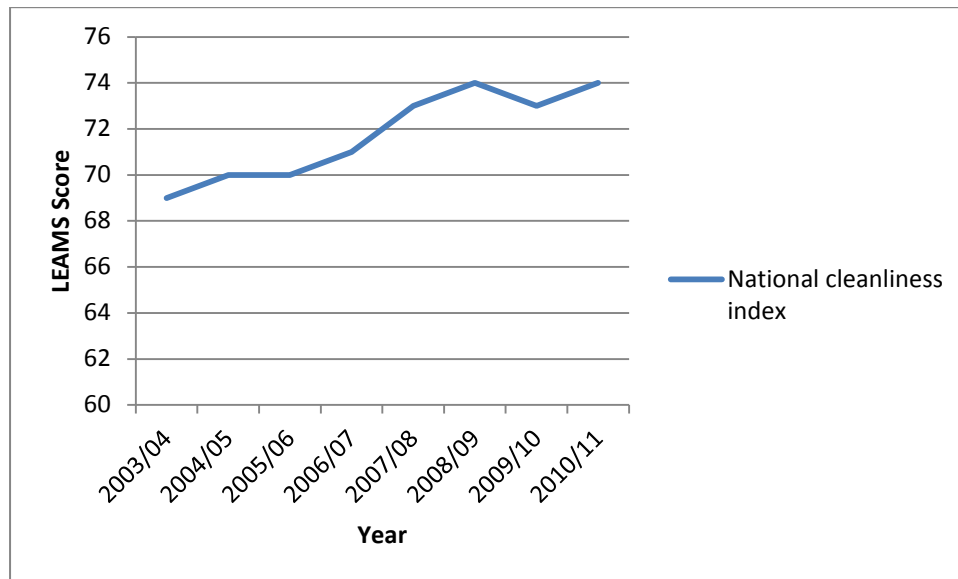
Available tonnage data does not provide a good basis to estimate change over time because:

- There is no comparable historical data (and the estimate in this study could only be reached via a one-off bespoke study, given the available data sources)
- The uncertainty around the estimates here could easily be greater than any changes seen over time, thus masking, or falsely suggesting changes

Two time series datasets do however relate to litter. These are the Scottish Household Survey²³⁸ (looking at public perceptions of the problem) and LEAMS (Local Environmental Audit and Management System) which assesses street cleanliness across Scottish local authorities. Neither are a direct measure of litter levels. The former measures perception of the problem, but this is unlikely to relate directly to volumes (for example, a 10% fall in the amount of litter might not equate to a 10% fall in concern about the problem). Equally, the LEAMS score is a measure of street cleanliness, and is driven as much (if not more so) by local authority clean-up efforts than by the rate of littering. It also focuses only on defined public areas, whereas litter can easily arise much more widely. LEAMS awards a grade to each area assessed, and these are then used to calculate an overall score. The higher the score, the less litter was seen in assessment areas.

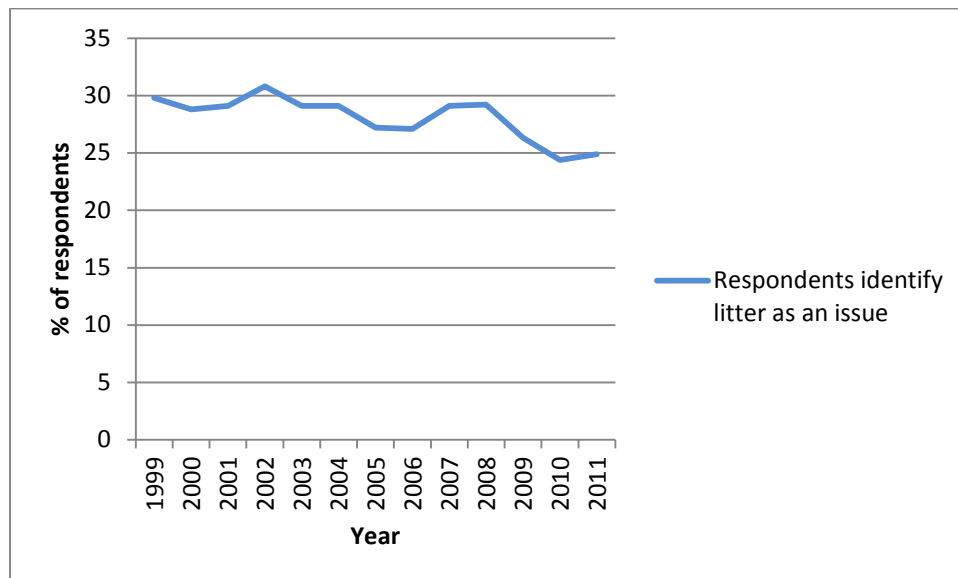
Trends in these two measures can be seen over time.

Diagram 7: Scottish Leams Scores 2003/04 to 2010/11²³⁹ (note, vertical axis does not start at zero)



LEAMS scores have improved over time, showing there is less litter in assessed areas. However this is as likely to reflect increased clearance activity by local authorities, as it is an actual reduction in litter.

Diagram 8: Scottish Household Survey data showing the percentage of people identifying litter as common or fairly common in their neighbourhood 1999-2011²⁴⁰



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The survey data shows a slight fall over time, but it should be noted that the format of this question has also changed over the period. In particular, the addition of dog fouling as a separate category from 2009 onwards (an issue which also scores very highly) may account for some of reduction towards the end of the time series. As with the LEAMS score, perception of litter may reflect efforts by local authorities to clean litter up, as much as it reflects the actual rate of littering.

Appendix 2: Calculating flytipping volumes in Scotland

Estimating flytipping tonnages

For reasons explained in the main report, we focused on estimating the amount of litter cleaned up by local authorities. Scotland's national waste data system, WasteDataFlow has a category for tonnages arising from flytipping. However in the course of this project it became apparent that significant flytipped tonnages were in fact entered as street cleansing alongside litter (see appendix 1), especially where clean-up crews were handling both littered and flytipped waste at the same time. Some flytipped waste was also being separated for recycling.

Therefore in the case of flytipping, we first sought to estimate incident numbers. WasteDataFlow has a category to record the number of flytipping incidents, as does Flycapture, a voluntary reporting system.

As part of their study, Eunomia matched records in the two systems together for 2011. In most cases reports matched. In some cases authorities were reporting to one system or the other, and the highest value was taken. In one or two cases, there was no data and incidents were estimated from interview data. This approach gave a total number of incidents of 61,227. We rounded this down to the nearest thousand for the purposes of the current report.

Eunomia then assigned a standard weight to the different sizes of incident recorded in Flycapture, and used this, plus the Flycapture data on incident frequency to assign an average incident weight of 0.437t. When applied to the estimated number of incidents in Scotland, this gives a total of 26,756t. Again, we rounded down to 26,000t to reflect the uncertainty in this estimate. Greater detail on the calculation of incident weights is below.

Alternative approaches

An alternative approach to arriving at an average incident weight was trialled as part of this research programme. 10 local authorities submitted both incident numbers and tonnage data for flytipping to WasteDataFlow in 2011. Taking these figures at face value gives a lower average incident weight of 0.3t (with considerable variability between authorities). However, following the Eunomia survey, it seems likely that the explicit flytipping tonnages in WasteDataFlow used for this calculation may not reflect all flytipped waste collected. This, plus authority to authority variation is likely to account for the difference, and in fact it is reassuring the two approaches arrive at reasonably comparable amounts (using the lower average suggests a national flytipping tonnage of around 18,500t). The Eunomia estimate has been preferred as it is both better informed by survey evidence, and because the higher total figure is also likely to be justified by the fact the incident count is almost certainly a low end estimate, as described below.

Coverage of incidents

WasteDataFlow records 47,662 flytipping incidents in Scotland in calendar year 2011 (with 27/32 local authorities reporting). Flycapture records 27,273 (with 21/32 local authorities reporting). Many but not all of these incidents are the same, hence the matching approach described above to arrive at an overall estimate. However it is likely this approach still underestimates the number of incidents in Scotland. Local authorities may not log all individual incidents (e.g. where a single clean-up crew visit several sites on trip, the emphasis is on fast and effective clearance, not counting individual incidents) and practice in this regard will vary across authorities and incident types. Thus, the estimate of 61,000 incidents is a low end estimate, as it counts only those incidents separately logged by local authorities.

The Eunomia survey and estimated direct costs

Data on flytipping expenditure was gathered at the same time as that on litter, as described in appendix 1.

The split of weights across incident types

The weight of individual incidents is not recorded in national data. Nonetheless, where incident size is stated on Flycapture, it is possible to estimate a likely average weight for a given size of incident.

Weights were estimated as follows:

Table 3: Estimated incident weights applied to 2011 Flycapture data (29,126 incidents in total)

Reported Load Size	Estimated Load Weight (tonnes)	%incidents	Total estimated tonnage	% of total tonnage
Single Black Bag	0.014	19	76	0.6
Single Item	0.014	20	81	0.6
Car Boot or Less	0.042	18	220	1.7
Small Van Load	0.336	25	2,400	18.8
Transit Van Load	1	14	4,145	32.5
Tipper Lorry Load	3	2	1,863	14.6
Significant / Multi Loads	5	3	3,955	31.0
Total (Flycapture only)			12,740	100.0
<i>Average weight per incident</i>			<i>0.437</i>	

The rationale for the assigned weights was that single black bag was likely to weigh ~14kg (assuming standard household waste density factors, and eight bin bags to a cubic metre). We tend to think this is conservative. We assigned the same weight to single items (though the weight difference between a small item like a TV and a larger one like a fridge or piece of furniture will be significant). We then assumed a car boot might hold three black bags. In practice, for the larger loads, it is much harder to determine sensible weight ranges. We have tended to assign relatively low weights.

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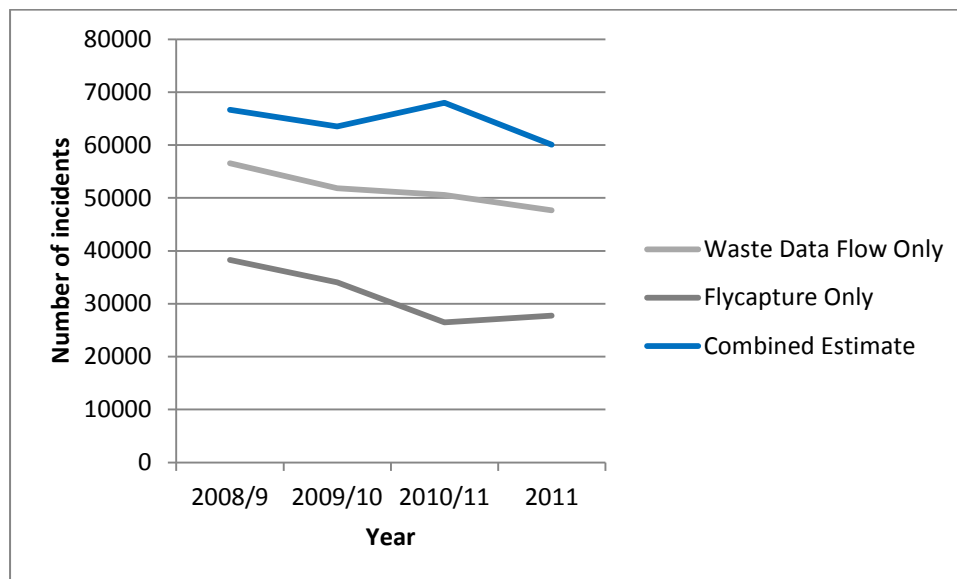
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The above analysis is also the basis for the claim that over 90% of flytipping tonnages are likely to originate from commercial rather than industrial sources, and be associated with larger incident sizes. In the figures shown here, just 3% of the estimated tonnage is associated with the smallest three incident classes. A maximum of 10% therefore seems a relatively safe claim.

Change over time

It is not possible to make any robust statements about change over time, as the data set for any given year is not comprehensive, and the amount of data local authorities report changes from year to year. Incident level data in the individual systems (WasteDataFlow and Flycapture) does appear to show a decline, but this is as likely to be a decline in separately reported incidents as in actual levels of flytipping. This impression is strengthened by application of the combined method for estimating overall incident numbers; here no clear trend is apparent. Note that in the graph below, 2011 is shown as a calendar year; this means that the first quarter overlaps with the previous reporting period. This data set draws solely on WasteDataFlow and Flycapture, as this is all that is available for historical records. The final year data therefore differs very slightly from the Eunomia estimate (which also took into account interview data, but covered 2011 only).

Diagram 9: Flytipping incidents reported in Scotland 2008-2011 (note the final year is calendar year, and thus not strictly comparable to previous periods)



Notes

¹ Scottish Government, *Code of Practice on Litter and Refuse Issued Under Section 89 of the Environmental Protection Act 1990, Appendix 1: Litter and the Law in Scotland*,

<http://www.scotland.gov.uk/Publications/2006/12/13125718/29>

² Dumb Dumpers, *What is Flytipping*, <http://www.dumbdumpers.org/what-is-flytipping/> [checked 23/04/13]

³ Eunomia for Zero Waste Scotland, 2013, *Exploring the Indirect Costs of Litter in Scotland*

⁴ Brook Lyndhurst for Zero Waste Scotland, 2013, *Rapid Evidence Review of Littering Behaviour and Anti-Litter Policies*

⁵ Further detail on WasteDataFlow can be found on their website at <http://www.wastedataflow.org/>. Although a UK wide reporting system, data requirements for Scotland are sometimes unique, as agreed with SEPA.

⁶ Further detail on Flycapture can be found on their website at <http://www.environment-agency.gov.uk/research/library/data/41333.aspx>. Participation by Scottish local authorities is voluntary.

⁷ Further detail on LEAMS can be found on their website at <http://www.keepsotlandbeautiful.org/what-we-do/public-sector/leams/>.

⁸ Quantifying this was not a focus of this study, though in working out what is "litter" it became clear that naturally arising material accounts for tens of thousands of tonnes of waste from street cleansing and road maintenance in Scotland.

⁹ We assigned litter a similar weight to volume conversion factor to that typically used for uncompacted household waste, at 0.11. This factor is taken from Jacobs for Defra, 2010, *Commercial and Industrial Waste Survey 2009, Appendix I*,

<http://archive.defra.gov.uk/evidence/statistics/environment/waste/documents/commercial-industrial-waste101216.pdf> [checked 23/04/13]

¹⁰ See [appendix 1](#) for detail on how this was calculated

¹¹ All Scottish local authorities measure street cleanliness in prescribed areas that they have a responsibility to keep clean, via LEAMS (see above). This process is managed by Keep Scotland Beautiful, with funding from Audit Scotland. This process requires that a sample of these areas is visually assessed on a regular basis, with Keep Scotland Beautiful providing independent verification.

¹² Keep Scotland Beautiful, *Keep Scotland Beautiful's Local Environmental Audit and Management System Benchmarking Report 2010/11 for the Scottish Local Authorities*, p13

<http://www.keepsotlandbeautiful.org/resources/documents/34911BenchmarkingMasterV9Colour5429.pdf> [checked 25/04/13]

¹³ Keep Scotland Beautiful, as above, p4

¹⁴ Keep Scotland Beautiful, as above, p13

¹⁵ AEA and Wasteswork for Zero Waste Scotland, 2010, *The composition of municipal solid waste in Scotland*, <http://www.zerowastescotland.org.uk/content/composition-municipal-waste-scotland> [checked 23/04/13]

¹⁶ Anecdotal practitioner feedback during the course of this research project suggests that carrier bags may be underestimated in litter counts, as they are more likely to blow away from frequently cleared and monitored areas to become stuck in undergrowth, against fence lines, and in trees, where they are less likely to be counted. It is unlikely this would make a significant weight difference to a study on litter however, given their low item weight.

¹⁷ We have assumed the average weight of a new thin gauge single use carrier bag to be 8 grams.

¹⁸ WRAP, 2012, *New Figures on Carrier Bags Released by WRAP*, <http://www.wrap.org.uk/content/new-figures-carrier-bags-use-released-wrap> [checked 23/04/13]

¹⁹ This split is derived from the Eunomia survey of local authorities. Greater detail is in [appendix 1](#).

²⁰ The true number of bags in circulation is undoubtedly higher, which would be expected to increase this total. However, the 2010 compositional study has no data on bags collected at supermarkets for recycling, and this might be expected to reduce this total (as some bags would be excluded from being



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counted in the waste data). In the absence of hard evidence, we have assumed these two factors cancel out. It is interesting to note that if we take the apparent total weight of carrier bags in the litter stream, and divide by the average weight per bag, a far higher estimate is achieved for the number of littered bags. However, we discounted this approach, as it seems likely that bags in the waste stream (which may be wet, or mixed with other waste) will have a far higher average weight than new bags.

²¹ See [appendix 1](#) for detail

²² See [appendix 1](#) for detail

²³ See [appendix 1](#) for time series data from LEAMS

²⁴ See [appendix 1](#) for time series data from the Scottish Household Survey

²⁵ See [appendix 1](#) for greater detail

²⁶ Diagram based on a sample of 28,546 incidents recorded in Flycapture in 2011/12. For greater detail on the available sources of Flytipping data, please see [appendix 2](#). The Flycapture database does not capture all incidents in Scotland, but we assume that it does capture a representative sample.

²⁷ Based on a sample of 28,546 incidents recorded in Flycapture in 2011/12; see previous note

²⁸ See [appendix 2](#) for greater detail

²⁹ In the course of researching this project, it became apparent that some local authorities post-sort waste, particularly flytipped waste, to extract recyclate, as this reduces their eventual disposal costs. While generating some savings, this remains an expensive and inefficient way to collect recyclate, and material quality will be much lower than that of material disposed of via legitimate routes.

³⁰ Scottish Government, 2012, *Scotland's People: Annual Report: Results from 2011 Scottish Household Survey*, p27, <http://www.scotland.gov.uk/Publications/2012/08/5277/downloads> [checked 23/04/13]

³¹ Scottish Government, 2012, p31

³² Scottish Government, 2012, p28

³³ Scottish Government, 2012, p29

³⁴ Keep Scotland Beautiful, as above, p7

³⁵ For greater detail see the rest of this section, and the detailed presentation in *Eunomia for Zero Waste Scotland*, 2013.

³⁶ *Eunomia for Zero Waste Scotland*, 2013, p61

³⁷ *Eunomia for Zero Waste Scotland*, 2013, p59

³⁸ *Eunomia for Zero Waste Scotland*, 2013, p61

³⁹ *Eunomia for Zero Waste Scotland*, 2013, p58

⁴⁰ *Eunomia for Zero Waste Scotland*, 2013, p65

⁴¹ *Eunomia for Zero Waste Scotland*, 2013, p64

⁴² The level of detail and accuracy in these estimates varied across contexts; itemised costs are very hard to estimate. However, across respondents and authorities, we believe the cumulative picture to be accurate.

⁴³ Combined gate fees and landfill tax in 2011 was just over £80 per tonne. See median figures in WRAP, 2013, *Gate Fees Report 2012*, <http://www.wrap.org.uk/content/wrap-gate-fees-report-2012> [checked 10/06/13]

⁴⁴ We have assumed the alternative disposal route for litter is a local authority provided public bin (with waste going to landfill). Where legitimate disposal was in fact to an alternative route (such as Recycle on the Go, or public bins that are sorted before landfill disposal) then some of this disposal cost might be additionally saved.

⁴⁵ See [section 3.3](#) on flytipped tonnages where it is estimated just 10% of flytipped waste is likely to have originated directly from householders. In those cases legitimate disposal would have been via the local authority collection services or Household Waste Recycling Centre, with the local authority still bearing the disposal costs. In all other cases legitimate disposal would have involved a business or waste collection service, and no disposal costs would have been borne by the local authority.

⁴⁶ Transport Scotland is responsible for litter clearance from motorways and special roads. Local authorities are responsible for litter clearance on the majority of other roads, including trunk routes.

⁴⁷ Personal communications with Edinburgh Airport for the purpose of this research

⁴⁸ Detail on respective passenger numbers for Edinburgh, Glasgow and Aberdeen can be found here: Edinburgh Airport, *Facts and Figures*, <http://www.edinburghairport.com/about-us/facts-and-figures>; Glasgow Airport, *Facts and Figures*, <http://www.glasgowairport.com/about-us/facts-and-figures>; Aberdeen Airport, *Facts and Figures*, <http://www.edinburghairport.com/about-us/facts-and-figures> [all checked 10/06/13]. However, it seems likely that litter cleared may originate outwith the airport itself (for example being blown onto the site), and thus there may be a weak relationship to passenger numbers.

- ⁴⁹ Personal communications with University of Edinburgh for the purpose of this research
- ⁵⁰ This is based on student numbers for 2009/10 obtained from the Higher Education Statistics Agency.
- ⁵¹ Personal communications with Blair Drummond Safari Park for the purpose of this research
- ⁵² Eunomia for Zero Waste Scotland, 2013, p43
- ⁵³ Total UK costs are identified as being £196,768 in Eunomia for Zero Waste Scotland, 2013, p47. This figure assumes 8.4% of costs relate to Scotland (in line with population share).
- ⁵⁴ Again, a UK figure is identified in Eunomia for Zero Waste Scotland, 2013, p47, and again, we have calculated a cost split based on population. Eunomia apply the minimum wage to the number of volunteer hours identified, while acknowledging this may well underestimate the true value of the volunteer hours significantly.
- ⁵⁵ This is very much a low end estimate for the clean-up value from National Spring Clean. In their 2012 report Keep Scotland Beautiful highlight that registrations may significantly understate actual participation (with many people turning up to events without registering). In addition, a huge number of participants are children, and they are not accounted for in the above calculation. Finally, Keep Scotland Beautiful seeks to account for the wider value of volunteering in estimating the value of National Spring Clean. In this report however we are simply interested in much more narrowly defined clean-up value. For the alternative approach, see Keep Scotland Beautiful, 2012a, *Analysis of National Spring Clean*.
- ⁵⁶ This includes those referred from local authorities, SEPA, and the police.
- ⁵⁷ Communication with COPFS for the purpose of this research. 2011/12 is typical of both the preceding and subsequent year.
- ⁵⁸ Greater detail on all the aspects of indirect costs, including a stricter definition of those which are “internalised” and “externalised” in economic terms is available in Eunomia for Zero Waste Scotland, 2013.
- ⁵⁹ For greater detail on this example, see Eunomia for Zero Waste Scotland, 2013, p11-18.
- ⁶⁰ Eunomia for Zero Waste Scotland, 2013, pii.
- ⁶¹ These are discussed in individual sections of Eunomia for Zero Waste Scotland, reference as above.
- ⁶² Eunomia for Zero Waste Scotland, 2013, p20
- ⁶³ Eunomia for Zero Waste Scotland, 2013, p19
- ⁶⁴ Eunomia for Zero Waste Scotland, 2013, p20
- ⁶⁵ Eunomia for Zero Waste Scotland, 2013, p20
- ⁶⁶ Specifically in relation to hazardous, drug related litter. See Eunomia for Zero Waste Scotland, 2013, p21
- ⁶⁷ Eunomia for Zero Waste Scotland, 2013, p27
- ⁶⁸ Eunomia for Zero Waste Scotland, 2013, p11
- ⁶⁹ Eunomia for Zero Waste Scotland, 2013, p11-14
- ⁷⁰ Eunomia for Zero Waste Scotland, 2013, p13
- ⁷¹ Eunomia for Zero Waste Scotland, 2013, p18
- ⁷² Eunomia for Zero Waste Scotland, 2013, p19
- ⁷³ Eunomia for Zero Waste Scotland, 2013, p19
- ⁷⁴ Eunomia for Zero Waste Scotland, 2013, p44
- ⁷⁵ Eunomia for Zero Waste Scotland, 2013, p45
- ⁷⁶ Eunomia for Zero Waste Scotland, 2013, p30-34
- ⁷⁷ Eunomia for Zero Waste Scotland, 2013, p34-35
- ⁷⁸ Eunomia for Zero Waste Scotland, 2013, p35
- ⁷⁹ Eunomia for Zero Waste Scotland, 2013, p49
- ⁸⁰ Eunomia for Zero Waste Scotland, 2013, p47
- ⁸¹ Eunomia for Zero Waste Scotland, 2013, p48
- ⁸² Eunomia for Zero Waste Scotland, 2013, p49
- ⁸³ Eunomia for Zero Waste Scotland, 2013, p37-41
- ⁸⁴ This is a combined cost for damage and vermin control from both pigeons and rats. See Eunomia for Zero Waste Scotland, 2013, p37-44 for details.



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- ⁸⁵ Eunomia for Zero Waste Scotland, 2013, p52
- ⁸⁶ Eunomia for Zero Waste Scotland, 2013, p53
- ⁸⁷ Eunomia for Zero Waste Scotland, 2013, p53
- ⁸⁸ Eunomia for Zero Waste Scotland, 2013, p53-54
- ⁸⁹ Eunomia for Zero Waste Scotland, 2013, p54
- ⁹⁰ Eunomia for Zero Waste Scotland, 2013, p55
- ⁹¹ TNS for Visit Scotland, 2013, *Scotland Visitor Survey 2011 and 2012: Highlights of Results*, p25
http://www.visitscotland.org/pdf/External%20Scotland%20Visitor%20Survey%202011-12_pptx.pdf
- ⁹² Scottish Government, *Growth Sector Statistics Database*, table 2.5,
<http://www.scotland.gov.uk/Topics/Statistics/Browse/Business/Publications/GrowthSectors/Database>
[checked 18/06/13]
- ⁹³ Visit Scotland, *Latest Statistics*,
http://www.visitscotland.org/research_and_statistics/tourismstatistics/latest_statistics.aspx [checked 18/06/13]. This figure represents just overnight stays. Day trips within Scotland account for a further £4.6 billion (same source).
- ⁹⁴ Eunomia for Zero Waste Scotland, 2013, p55
- ⁹⁵ Eunomia for Zero Waste Scotland, 2013, p51-52
- ⁹⁶ Potts, T and Hastings, E, for Marine Scotland, 2011, *Marine Litter Issues, Impacts, and Actions*, p22
<http://www.scotland.gov.uk/Resource/0040/00402421.pdf>
- ⁹⁷ United Nations Environment Programme (UNEP), 2005, *Marine Litter: An analytical overview*
http://www.unep.org/regionalseas/marinelitter/publications/docs/anl_oview.pdf
- ⁹⁸ Potts, T and Hastings, E, for Marine Scotland, 2011
- ⁹⁹ Marine Conservation Society, 2013, *Beachwatch Big Weekend 2012: Results of the UK's biggest beach clean and survey*,
http://www.mcsuk.org/downloads/pollution/beachwatch/2012/Beachwatch_summary_2012_lowres.pdf
- ¹⁰⁰
- ¹⁰¹ Potts, T and Hastings, E, for Marine Scotland, 2011
- ¹⁰² Potts, T and Hastings, E, for Marine Scotland, 2011, p25. This report also quotes a much earlier Scottish Water study in 2003 that estimated a cost of £16m associated with waste incorrectly flushed down the toilet. This relates to waste arising from behaviour that is out of scope for the terrestrial litter focus of this report, and additionally is not clear how this may interact with other estimates, so it is not factored into our calculation here.
- ¹⁰³ This assumes that the figures for costs to the fishing industry and to aquaculture identified in the Marine Scotland study would be additional to the figures here. The identified costs for ports and harbours in the Marine Scotland study seems likely to be additional, and would increase this figure to around £12m. Costs identified for local authorities would be expected to double count between the Marine Scotland study and the present one. Other costs may be additional, but we have erred on the side of caution.
- ¹⁰⁴ Potts, T and Hastings, E, for Marine Scotland, 2011, p15-19
- ¹⁰⁵ Potts, T and Hastings, E, for Marine Scotland, 2011, p17
- ¹⁰⁶ For examples of the damage ingestion of small particles can cause, see Science for Environment Policy, May 2013, *Plastics can concentrate toxic pollutants, endangering marine ecosystems*,
<http://ec.europa.eu/environment/integration/research/newsalert/pdf/326na6.pdf> and Science for Environment Policy, April 2013, *Microplastic particles in the North Sea could harm marine organisms and enter human food chain*,
<http://ec.europa.eu/environment/integration/research/newsalert/pdf/324na1.pdf>, European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol. However it is not necessarily the case that "littering" as defined in the majority of this report will be a key factor in this.
- ¹⁰⁷ See [appendix 1](#) for greater detail
- ¹⁰⁸ Eunomia for Zero Waste Scotland, 2013 as above, p46 assume that 100% capture for recycling from this waste stream is unrealistic. Their assumptions about the value for a given tonne of material are however identical.
- ¹⁰⁹ Details of this calculation are in [appendix 1](#)
- ¹¹⁰ The Eunomia survey identified that some authorities are post-sorting waste, but much of this appears to be naturally occurring material, rather than litter as such.

¹¹¹ Scottish Government, *Policy Statement – Zero Waste Regulations*, <http://www.scotland.gov.uk/Publications/2011/10/14112444/5>

¹¹² This is not to say it may not exist – the presence of security guards or CCTV at a site might be considered a deterrent to flytipping for example.

¹¹³ Figures taken from Eunomia for Zero Waste Scotland, 2013. Their report summarises impacts on p73-75. Our table combines some categories, and is not an exact copy. Where they have given a qualitative comment on the “most likely” figure, we have translated this into an indicative financial value.

¹¹⁴ Most figures in this table are quoted between a low end estimate of 0.1% (suggesting that litter contributes to one thousandth of the total costs) and a high end estimate of 10%. In the case of mental health costs, such a high estimate is not supported by the available evidence, and we have given the Eunomia research team’s preferred estimate as the upper bound.

¹¹⁵ No upper bound is available for this, as there was no way to scale the available evidence to Scotland as a whole.

¹¹⁶ Uncertainty around this issue was felt to be very high by the Eunomia research team, and no preferred estimate is given.

¹¹⁷ This assumes costs from crime of around £15m, for which the evidence is perhaps most robust. For the other categories, the low end estimate is assumed to apply, which may well be conservative.

¹¹⁸ A much higher value would be likely to be realised if the Eunomia study’s estimate of mental health impacts is indeed close to their initial estimate, or if impacts on property values could be concluded with greater confidence, with this latter factor having the potential to push internalized indirect costs very high indeed. Other factors, for which evidence was not identified in the course of this research, could also contribute to future revisions of this figure.

¹¹⁹ Brook Lyndhurst for Zero Waste Scotland, 2013

¹²⁰ Southerton D, McMeekin A, Evans D, 2012, *International Review of Behaviour Change Initiatives*, Scottish Government <http://www.scotland.gov.uk/Resource/Doc/340440/0112767.pdf> [checked 23/4/13]

¹²¹ Brook Lyndhurst for Zero Waste Scotland, 2013, p14

¹²² Brook Lyndhurst for Zero Waste Scotland, 2013, p6

¹²³ Brook Lyndhurst for Zero Waste Scotland, 2013, p15-16, highlights that 54% admitted to having dropped litter at some point in Scotland in a survey in 2007 (and this is similar to surveys in England and Wales). 46% admitted they still did so, at least occasionally. A Keep Britain Tidy survey in 2009, also cited in the Brook Lyndhurst study, found that 20% of people admitted to littering from a vehicle in the previous 6 months.

¹²⁴ It takes time for food items to biodegrade. On our highest mountains especially, where temperatures are very low for much of the year, an item such as a banana skin can take two years to rot away. The John Muir Trust found banana skins to be one of the most frequent litter items on Ben Nevis in both 2009 and 2011 – see John Muir Trust, 2009, *Banana Skins Blight Ben Nevis*,

<http://www.jmt.org/news.asp?s=2&cat=Land&nid=JMT-N10412>, and John Muir Trust, 2011, *Tackling a slippery issue on Ben Nevis*,

<http://www.jmt.org/news.asp?s=2&cat=Land&nid=JMT-N10582> [both checked 07/06/13]. Keep Scotland Beautiful highlight that orange peel and banana skins can take two years to biodegrade in a marine environment - see Keep Scotland Beautiful, *Seaside Awards: Litter*,

<http://www.keepsotlandbeautiful.org/environmental-quality/seaside-awards/litter/the-facts/> [checked 07/06/13]

¹²⁵ Brook Lyndhurst for Zero Waste Scotland, 2013, p21-22

¹²⁶ Brook Lyndhurst for Zero Waste Scotland, 2013, p6

¹²⁷ Brook Lyndhurst for Zero Waste Scotland, 2013, p17

¹²⁸ Brook Lyndhurst for Zero Waste Scotland, 2013, p18

¹²⁹ Brook Lyndhurst for Zero Waste Scotland, 2013, p18

¹³⁰ Brook Lyndhurst for Zero Waste Scotland, 2013, p8

¹³¹ A distinction can be drawn between “active” and “passive” littering, see Brook Lyndhurst for Zero Waste Scotland, as above, p15



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¹³² Keep Scotland Beautiful, *Keep Scotland Beautiful's Local Environmental Audit and Management System Benchmarking Report 2010/11 for the Scottish Local Authorities*, p7
<http://www.keepsotlandbeautiful.org/resources/documents/34911BenchmarkingMasterV9Colour5429.pdf> [checked 25/04/13]

¹³³ Keep Scotland Beautiful, as above, p11

¹³⁴ Keep Scotland Beautiful, as above, p12

¹³⁵ Keep Scotland Beautiful, as above, p18

¹³⁶ The Litter Monitoring Body 2011, *The National Litter Pollution Monitoring System*, p12,
<http://www.litter.ie/Website/2010%20Website/6105%20Final%20Annual%20Report%202010%20210411.pdf>

¹³⁷ Brook Lyndhurst for Zero Waste Scotland, 2013, p21

¹³⁸ Brook Lyndhurst for Zero Waste Scotland, 2013, p22

¹³⁹ Brook Lyndhurst for Zero Waste Scotland, 2013, p23

¹⁴⁰ Brook Lyndhurst for Zero Waste Scotland, 2013, p24

¹⁴¹ Brook Lyndhurst for Zero Waste Scotland, 2013, p25

¹⁴² Brook Lyndhurst for Zero Waste Scotland, 2013, p24

¹⁴³ Brook Lyndhurst for Zero Waste Scotland, 2013, p30

¹⁴⁴ Brook Lyndhurst for Zero Waste Scotland, 2013, p33

¹⁴⁵ Brook Lyndhurst for Zero Waste Scotland, 2013, p33

¹⁴⁶ Brook Lyndhurst for Zero Waste Scotland, 2013, p33

¹⁴⁷ Brook Lyndhurst for Zero Waste Scotland, 2013, p33

¹⁴⁸ "Nudge" is one of several different approaches to influencing behaviour. A short summary (including comparison to other approaches), can be found in Darnton A and Evans D, for Scottish Government, 2013, *Influencing Behaviours: A technical Guide to the ISM Tool*,
<http://www.scotland.gov.uk/Resource/0042/00423531.pdf>

¹⁴⁹ Brook Lyndhurst for Zero Waste Scotland, 2013, p26

¹⁵⁰ Brook Lyndhurst for Zero Waste Scotland, 2013, p27

¹⁵¹ Brook Lyndhurst for Zero Waste Scotland, 2013, p27

¹⁵² Brook Lyndhurst for Zero Waste Scotland, 2013, p27-28

¹⁵³ Brook Lyndhurst for Zero Waste Scotland, 2013, p31

¹⁵⁴ Brook Lyndhurst for Zero Waste Scotland, 2013, p15

¹⁵⁵ Brook Lyndhurst for Zero Waste Scotland, 2013, p28

¹⁵⁶ Brook Lyndhurst for Zero Waste Scotland, 2013, p28

¹⁵⁷ Brook Lyndhurst for Zero Waste Scotland, 2013, p29

¹⁵⁸ Brook Lyndhurst for Zero Waste Scotland, 2013, p29

¹⁵⁹ Brook Lyndhurst for Zero Waste Scotland, 2013, p29

¹⁶⁰ Brook Lyndhurst for Zero Waste Scotland, 2013, p44

¹⁶¹ Brook Lyndhurst for Zero Waste Scotland, 2013, p44

¹⁶² Brook Lyndhurst for Zero Waste Scotland, 2013, p45

¹⁶³ Brook Lyndhurst for Zero Waste Scotland, 2013, p52

¹⁶⁴ Brook Lyndhurst for Zero Waste Scotland, 2013, p54

¹⁶⁵ Brook Lyndhurst for Zero Waste Scotland, 2013, p58

¹⁶⁶ Brook Lyndhurst for Zero Waste Scotland, 2013, p54

¹⁶⁷ Brook Lyndhurst for Zero Waste Scotland, 2013, p54

¹⁶⁸ Brook Lyndhurst for Zero Waste Scotland, 2013, p46

¹⁶⁹ Brook Lyndhurst for Zero Waste Scotland, 2013, p25

¹⁷⁰ Practitioner feedback was gathered informally over the course of the research programme from a range of individuals in local authorities and community organisations.

¹⁷¹ These projects will be reporting later in 2013.

¹⁷² For detail on National Spring Clean, see Keep Scotland Beautiful, 2012a

¹⁷³ See Marine Conservation Society, 2013

¹⁷⁴ Reporting on initiatives from 2011/12 is available on the Dumb Dumpers website at www.dumpdumpers.org. Projects from 2012/13 will report later in 2013.

¹⁷⁵ For more detail, visit their website at <http://www.keepsotlandbeautiful.org/environmental-quality/beautiful-scotland/>

¹⁷⁶ A flashmob is a group of people who assemble suddenly in a public place, perform an act for a brief time, then disperse

¹⁷⁷ People and Places Awards case studies are available from Keep Scotland Beautiful

¹⁷⁸ For more detail on Ecoschools in Scotland, visit their website at

<http://www.keepsScotlandBeautiful.org/sustainable-development-education/eco-schools>

¹⁷⁹ Eight supported projects focused on lunchtime littering by secondary school pupils, with a range of approaches piloted. Approaches included: targeting pupil awareness, adding infrastructure, engaging with local businesses and community groups, additional enforcement patrols, reward schemes for positive behaviours, and a range of media and communication techniques. The final project report will be published later this year and highlight learning that can be applied in other contexts in future.

¹⁸⁰ Brook Lyndhurst for Zero Waste Scotland, 2013, p64. This also matches practitioner feedback received informally over the course of this research programme.

¹⁸¹ Brook Lyndhurst for Zero Waste Scotland, 2013, p31

¹⁸² Based on discussion with practitioners in Scotland over the course of our research programme.

¹⁸³ Brook Lyndhurst for Zero Waste Scotland, 2013, p31. This view was also supported by our discussions with practitioners in the course of our research programme.

¹⁸⁴ There is no central record of the number of bins provided by local authorities, but we estimate the number provided is around 50,000. This is based on figures for local authorities where an estimate was available, extrapolated on a per capita basis for Scotland as a whole. There is no attempt to account for bins provided by other organisations in this estimate.

¹⁸⁵ Health concerns around unclean bins were highlighted in the review by Brook Lyndhurst, 2013, p31. Practitioner feedback during the course of our research programme also emphasised the importance of effective bin servicing.

¹⁸⁶ 'Smart bins' can measure how full they are, and transmit the information in real time. This allows for more efficient servicing (crews can clear bins before they get full, and not waste time going to bins that are empty). In the medium term it can also allow for better placement, with areas of high use rendered more visible by technology. Existing bins can also be barcoded to improve efficiencies, review suitability and location and consider future potential for Recycling on the Go

¹⁸⁷ 'Novelty' bins include talking bins (which produce sound effects, or say "thank you"), and bins designed in such a way as to attract people to them (e.g. animal designs for young children; incorporating basketball hoops for older children)

¹⁸⁸ New Scientist, January 2011, *Elevate yourself to become more virtuous*

<http://www.newscientist.com/article/mg20927953.000-elevate-yourself-to-become-more-virtuous.html> [checked 10/06/13]

¹⁸⁹ Though AG Barr have offered a deposit return system for a long time – and still sell around 30,000,000 returnable bottles each year. See AG Barr Plc., *Frequently Asked Questions*, http://www.agbarr.co.uk/ces_general.nsf/wpg/about_us-frequently_asked_questions.html [checked 10/06/13]

¹⁹⁰ The most robust evidence comes from the US, where comprehensive studies looked at beverage container litter before and after the introduction of deposit or incentive schemes in a number of states in the 1970s and 1980s. Several of these studies are summarised here: Container Recycling Institute, *Bottle Bill Resource Page* <http://www.bottlebill.org/about/benefits/litter/bbstates.htm>. These studies are however now somewhat dated, and littering behaviour and container types may be different in a Scottish context. A more recent report reached very positive conclusions about the impact on littering of Germany's deposit system. Though the pre and post measures used are not directly comparable, the 99% return rate on targeted containers clearly indicates very few of these containers are ending up in the litter stream. See Price Waterhouse Cooper, 2011, *Reuse and Recycling Systems for Selected Beverage Packaging from a Sustainability Perspective An analysis of the ecological, economic and social impacts of reuse and recycling systems and approaches*, p204-206.

to solutions for further development

¹⁹¹ Brook Lyndhurst for Zero Waste Scotland, 2013, p56

¹⁹² The Litter Monitoring Body, 2011, p25. Irish national litter monitoring data is available on an annualised basis going back to 1999/2000. However, the earliest reports are not in the same format as



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subsequent ones as the system was under development. All reports can be seen here:

http://www.litter.ie/system_survey_results/index.shtml

¹⁹³ Covery F, McDonnell, S and Ferreira S, January 2007, *The Most Popular Tax in Europe? Lessons from the Irish plastic bags levy*, in *Environmental Resource Economics*, 38, p8. The original litter survey referenced in this article is no longer available at the link given.

¹⁹⁴ Exodus Research for Zero Waste Scotland and the Welsh Government, *Consumer Behavioural Study on the Use and Re-use of Carrier Bags 2012*, forthcoming

¹⁹⁵ Further information on the grants scheme is available at www.dumbdumpers.org

¹⁹⁶ Brook Lyndhurst for Zero Waste Scotland, 2013, p31

¹⁹⁷ Brook Lyndhurst for Zero Waste Scotland, 2013, p32

¹⁹⁸ Brook Lyndhurst for Zero Waste Scotland 2013 suggests strongly that this is currently the case, see p32

¹⁹⁹ Based on discussions with practitioners in the course of our research programme. Where fixed penalty notices are issued to children, and not paid, subsequent referrals can be made via the Crown Office and Procurator Fiscal Service (COPFS) to the Children's Reporter. However warnings by local authority enforcement officers are most commonly deployed in these situations.

²⁰⁰ Keep Britain Tidy, 2011, *The effectiveness of enforcement on behaviour change – Fixed Penalty Notices From Both sides of the line*, p6

http://keepbritaintidy.org/ImgLibrary/Effectiveness%20of%20Enforcement_FINAL_3509.pdf

²⁰¹ A view also endorsed in Defra's guidance on issuing fixed penalty notices. See Defra 2007, *Local Environmental Enforcement – Guidance on the Use of Fixed Penalty Notices*, p82

<http://archive.defra.gov.uk/environment/quality/local/legislation/cnea/documents/fixed-penalty-guidance.pdf>

²⁰² Brook Lyndhurst for Zero Waste Scotland, 2013, p32

²⁰³ Brook Lyndhurst for Zero Waste Scotland, 2013, p32

²⁰⁴ Brook Lyndhurst for Zero Waste Scotland, 2013, p32

²⁰⁵ Brook Lyndhurst for Zero Waste Scotland, 2013, p32. Perception aside, given the number of penalties issued, and the cost to local authorities of enforcement, the evidence in the current report strongly suggests enforcement activity does not raise revenue.

²⁰⁶ Keep Britain Tidy, 2011, p8

²⁰⁷ Keep Britain Tidy, 2011, p9

²⁰⁸ Keep Britain Tidy, 2011, p11

²⁰⁹ Fixed penalty notices in Scotland are issued under section 88 of the Environmental Protection Act 1990 and are currently set at £50. Payment of the fixed penalty notice discharges the individual from any criminal liability. If an offender is referred to the COPFS for non-payment this may result in a "fiscal fine" (up to £300). Where the choice is taken to prosecute rather than issue a fiscal fine, fines of up to £2500 may apply, though they are likely to be significantly lower than this.

²¹⁰ Keep Scotland Beautiful for Zero Waste Scotland 2013, *Local Authority Environmental Protection Act 1990 Part II and Part IV Monitoring Survey 2011 / 2012*

²¹¹ Keep Scotland Beautiful for Zero Waste Scotland, 2013

²¹² The potential benefits of extending enforcement powers to appropriately trained local authority staff were also highlighted in England by Keep Britain Tidy, 2011, p12.

²¹³ Current guidance within the Code of Practice on Litter and Refuse is to issue under 16s with warning letters

²¹⁴ Cabinet Office, 2012, *Applying behavioural insight to reduce fraud, error, and debt*, p28,

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60539/BIT_FraudErrorDebt_accessible.pdf

²¹⁵ In 2010/11 Scottish local authorities issued 11,126 fixed penalty notices, and had 432 enforcement officers. See Keep Scotland Beautiful for Zero Waste Scotland, 2013

²¹⁶ Environmental Protection Act 1990 sections 93 and 94. Premises on which a Notice might be served are as described in the Street Litter Control Notices Order 1991, as amended in 1997. These include betting offices and shops, premises where lottery tickets are sold, premises where goods are displayed adjacent to or in front of the premises, fast food premises.

²¹⁷ Environmental Protection Act 1990 section 90

²¹⁸ The types of land which can be designated are defined by the Litter Control Areas Order 1991 (amended 1997) and include public car parks, shopping centres, business parks, industrial estates, cinemas, theatres, sports facilities, beaches, promenades, aerodromes, marinas, public open space under the control of certain public bodies, land used for markets, motorway service

stations, roadside picnic areas, camping and caravan sites.

²¹⁹ Keep Scotland Beautiful for Zero Waste Scotland, 2013, contains quantified results, but several authorities also made comments in the course of the exercise.

²²⁰ In 2010/11 just one local authority made use of Street Litter Control Notices (issuing 2) and just four authorities made use of Litter control areas (designating 8 areas in total). Keep Scotland Beautiful for Zero Waste Scotland, 2013

²²¹ Based on discussions with practitioners during the course of our research programme.

²²² This is a very difficult area to research

²²³ Again, there is little formalised evidence relating to this area, but practitioner insights in the course of our research programme were very consistent.

²²⁴ Projects funded by the Flytipping Small Grants Scheme have included the use of physical barriers such as gates, fences, boulders and bunds to restrict vehicular access to known sites. CCTV is currently being trialled on an 'orphan land' site in Glasgow – this project will be evaluated and reported on later this summer.

²²⁵ Again, this view is based on practitioner insights. Enforcement professionals can use location data to help build cases, predict where crimes may be committed, and track serial offenders.

²²⁶ Reporting on these interventions is referenced above

²²⁷ The Clean Neighbourhoods and Environment introduced a £300 fixed penalty notice for breach of duty of care

²²⁸ It is of course impossible to demonstrate a counterfactual scenario where no action was taken. However, considering simply clean up alone, 15,000t of litter left on our streets would clearly have significant, and very noticeable consequences. While localised enforcement and education initiatives have led to change, robustly demonstrating this is difficult, given the challenges of measurement already discussed in this report. Improved work on measurement should also improve our ability to learn from and improve interventions.

²²⁹ Scottish Government, Code of Practice on Litter and Refuse Issued Under Section 89 of the Environmental Protection Act 1990, Appendix 1: Litter and the Law in Scotland, as above

²³⁰ For example, Falkirk Council's Litter Strategy Team delivered a flytipping project in 2012/13 which involved engagement with Scottish Canals and the Police

²³¹ See their websites for more details at <http://www.peopleagainstlitter.org/> and <http://green-butterfly.org.uk/ali.html>

²³² See their website for more details at www.mcsuk.org/scotland

²³³ Partners include: Scottish Government, Keep Scotland Beautiful, CoSLA, SEPA and the CIWM. Wider stakeholders include Duty Bodies such as Network Rail, Transport Scotland and Scottish Canals (and their contractors); major landowners such as the Forestry Commission and the National Parks; the business community and commercial sector; schools and the broader educational community; third sector and NG organisations; tourism agencies.

²³⁴ This counts overnight stays only and includes 6.5 million from the rest of the UK (2011 data) and 2.2 million from overseas (2012) data. For sources see Visit Scotland, *Visitor Research – UK*,

<http://www.visitscotland.org/research-and-statistics/visitor-research/uk-visitors.aspx>, and Visit Scotland, *Latest Statistics*,

<http://www.visitscotland.org/research-and-statistics/tourismstatistics/latest-statistics.aspx>, [both checked 18/06/13]

²³⁵ AEA and Wasteswork for Zero Waste Scotland, 2010

²³⁶ Exodus Research for Zero Waste Scotland, 2012, *The Composition of Mixed Waste from the Scottish Health and Social Care, Education, Motor, Wholesale and Retail Sectors in 2011*,

<http://www.zerowastescotland.org.uk/sites/files/wrap/The%20composition%20of%20waste%20from%20three%20sectors%20in%20Scotland.pdf> [checked 23/04/13]

²³⁷ Eunomia for Zero Waste Scotland, 2013, p46

²³⁸ Scottish Government, 2012, p27-31

²³⁹ Source data supplied by Keep Scotland Beautiful



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²⁴⁰ Data taken from Scottish Government, 2012, p27