



Evidence Review of Flytipping Behaviour

Prepared by: Zero Waste Scotland

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1 Executive Summary

Tackling 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, we retain value in Scotland’s economy. Flytipping represents waste that is disposed of illegally and irresponsibly, and – because there is significant potential to reuse or recycle these materials before they are exposed to the elements - tackling the problem is central to the ethos of a zero waste society. Flytipping also imposes 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.

This report provides a summary of evidence relating to the problem of flytipping in Scotland. It collates insights gained from flytipping research and intervention projects supported by Zero Waste Scotland (ZWS) over the past years. The evidence base on flytipping is variable in extent, and, as a result, this report adds more to some areas of our knowledge than others. The report revisits, and where possible updates, estimates on quantities, type, and source of flytipping incidents originally set out in ZWS’s flagship report “Scotland’s Litter Problem” in 2013 – the first time the problem had been systematically examined in Scotland.

For the first time, we also present publically findings from a ZWS survey in 2014 on public attitudes and experiences of flytipping in Scotland. The report further contains a summary of flytipping-specific behavioural drivers which were not explored in detail in the litter report mentioned above. Behavioural drivers were identified through a desk-based review of sources published in the UK and abroad. Detail on the review methodology and a summary of the individual sources can be requested from ZWS.

The report also presents some information on effective countermeasures. However, this is largely based on knowledge we already hold as an organisation as our desk-based review has found little additional information. While we have looked at studies on waste crime elsewhere in the UK for comparison and insight as we hoped to find evidence of “what works” in terms of anti-flytipping enforcement and interventions, we have been forced to conclude the existing evidence base for this is very limited. New developments in monitoring in Scotland may enable more robust conclusions in future, and an increased focus on waste crime across the UK, and internationally, may help provide a broader range of examples elsewhere in future. ZWS will continue to actively monitor developments in this area.

This report addresses the following topics:

- How much flytipping takes place in Scotland,
- What waste types flytipping is made up of,
- What flytipping costs Scottish society,
- What the known drivers of flytipping are,
- How flytipping is perceived by the public,
- Evidence on effective countermeasures.

Evidence on drivers for flytipping and effective countermeasures is an area of growing concern in Scotland and elsewhere, as the consequences and costs of waste crime become better understood, and as new technology enables better monitoring of both the problem, and the effectiveness of different interventions. This report is a starting point for improving our understanding of what works, but we look forward to future developments in this area.

1.1 Defining the problem

Flytipping refers to the illegal deposit of waste – from a bin bag of household rubbish to large quantities of tyres or construction waste.

At the very least, flytipping is a serious blight – especially near landscape and tourist attractions – that impacts the appeal of an area. Flytipping imposes direct financial cost the public and private landowners which are related to the clearance, investigation and prosecution of flytipping incidents, as well as to prevention measures. Flytipping can also have less tangible, indirect consequences such as a negative effect on property values, increased crime rates or increased mental health issues in areas where flytipping is prevalent. Where the composition of flytipped waste includes hazardous waste, flytipping can threaten our ecosystem and wildlife and may even depict a risk to human life.

1.2 Quantifying flytipping in Scotland

ZWS's litter report (2013) estimates that at least 26,756 tonnes of waste is illegally flytipped each year and dealt with by local authorities, with an estimated 61,227 incidents occurring¹. Recent data from national reporting systems appear to indicate a slight decline from these estimates. However, changes to reporting systems² in recent years mean that these comparisons are not like for like in terms of local authority coverage, and thus we suspect the observed incident reduction is likely to be a consequence of this transition, rather than an actual trend. Improved data capture is vital to quantify the flytipping problem in Scotland with a higher level of confidence, and in the medium term, recent changes are expected to deliver this. .

In Scotland, flytipping is estimated to incur direct costs of at least £11m of taxpayers' money for clearance, disposal and enforcement activities. There are also significant indirect costs, but these are difficult to quantify, with most studies combining litter and flytipping costs in attempts to do so.

Household waste is the most frequently observed flytipped waste. Often this waste is deposited on streets, footpaths, the side of roads and the countryside. However, most of the flytipping by weight (potentially more than 90%) is deposited in association with larger scale incidents. Who is responsible for depositing waste is not always clear from monitoring data. Larger deposits will invariably be associated with organised offenders, while smaller ones may results from householders or businesses systematically or opportunistically dumping material.

1.3 Perception, causes and countermeasures

Various sources reviewed suggest that the vast majority of the public perceives flytipping as unacceptable and feel particularly outraged where the act appears premeditated, such as dumping waste in the countryside. However, parts of public seem to feel more accepting towards acts of flytipping in particular contexts. These include where the public is charged for what they may perceive should be a free service, such as waste disposal at recycling centres by small businesses, or bulky uplifts, or where people lack the space to store and the means to dispose of larger waste items conveniently. There is also evidence that some waste crimes, such as leaving a black bin bag near a bin store, are not perceived as flytipping by a majority of people, but rather littering, or not even an offense at all.

Flytipping incidents are characterised by a range of waste types, incident sizes and location profiles. Behind these different types of incidents can be quite differing motivations of the offending individuals and there are often specific contextual issues that will influence their behaviour. All sources on flytipping drivers reviewed concur that making economics savings (or gains), for instance from the

¹ Estimates based on 2012 data

² Namely the termination of 'Flycapture' and introduction of 'Flymapper'

avoidance of disposal fees or uplift costs, are strong motivators underlying most flytipping behaviour. But it is also clear from the literature reviewed that it is usually a set of additional physical and subjective conditions that increase a person's willingness to commit a flytipping offense.

Householders and opportunistic small business flytipping have been found to be often motivated by specific conditions in relation to:

- Local waste services (e.g. convenience, charges),
- Local environment characteristics (e.g. levels of urbanisation, economic deprivation),
- Attitude and knowledge (e.g. level of guilt; duty of care obligation),
- Household characteristics (to a limited degree).

'Organised' offenders have been found to be usually motivated by conditions in relation to:

- Economic pressures and market dynamics,
- Convenience,
- Perception of peer behaviour,
- Perception of risk of punishment,
- Attitude and knowledge.

Successful flytipping countermeasures usually apply a combination of approaches including infrastructure measures, education and awareness raising measures and enforcement measures. Guidance around these is already well established and in the public domain, such as ZWS's *Community Litter Prevention Guide* which includes advice on flytipping countermeasures.

Empirical literature and overseas examples of alternative approaches to tackling flytipping are extremely scarce and don't add much new insight. Options to advance countermeasures largely are related to improved data capture, such as via the use of advanced GIS-software, supporting reporting and enforcement measures. The low probability of being caught appears to be a main barrier to changing the behaviour of those with low levels of guilt towards flytipping and to whom economic margins and perceived inconvenience are strong behavioural drivers.

1.4 Conclusion

Flytipping behaviour and its motivation are reasonably well-understood. Recent research by ZWS has also improved our understanding of the public's perception of flytipping. This research supports the identification of a small number of avenues that may be pursued to advance flytipping prevention measures. Among those are measures related to improved information provision around the duty of care obligation of private householders and commercial businesses. It also suggests that information campaigns on what exactly constitutes flytipping, especially with regards to local waste services, where the act of flytipping might not be intentional criminal acts (e.g. placing a black bin bag near a bin store or placing reusable items on the kerbside), and why this matters.

The report also highlights that better data is central to fully understand the dimension of the problem in Scotland and how to cost-effectively tackle flytipping. By mapping where incidents occur, they become easier to clear up, to prevent in future, and to prosecute. Improved data capture would also help to gain insights into various research questions that are yet unanswerable based on the data available. These include questions about the exact role that different aspects of the waste service provision infrastructure (such as number, accessibility, charges etc.) have on flytipping behaviour, and would allow for an analysis of cost-effective changes to these. Better data would also be crucial to better understand displacement effects of successful flytipping interventions. Advances in technology, such as app developments for the public to feed into flytipping reporting might further enable improved understanding of the problem in Scotland and effective countermeasures.

2 Introduction

Tackling 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. Flytipping represents waste that is disposed of illegally and irresponsibly, and – because there is significant potential to recycle or reuse these materials before they are exposed to the elements - tackling the problem is central to the ethos of a zero waste society.

This report provides a summary of evidence relating to the problem of flytipping. While we focus on flytipping in Scotland, we also draw on insights from the rest of the UK and abroad. Our findings are based on a desk-based review of flytipping related research and evidence gained from local interventions supported by ZWS and other organisations.

The following topics are addressed in this report:

- How much flytipping takes place in Scotland,
- What waste types flytipping is made of,
- What flytipping costs Scottish society,
- How flytipping is perceived by the public,
- What the known drivers of flytipping are,
- Evidence on effective countermeasures.

This review aims to collate the existing knowledge of the causes and dimension of flytipping in Scotland, and how the problem may be addressed. It provides stakeholders with a concise overview of the main issues related to flytipping and provides the background that ZWS builds on to inform its future flytipping interventions.

Defining flytipping

Flytipping refers to the illegal deposit of waste – from a bin bag of household rubbish to large quantities of tyres or construction waste³. Unlike litter – which is often dropped habitually, sometimes accidentally, and usually involves only single, small waste items – flytipping is larger in scale and usually considered a premeditated, wilful act. Flytipping also includes waste incorrectly presented at kerbside. The offender might in such cases not always be aware that they are breaking the law.

The structure of this report

Section 3 provides an update on the how much flytipping there is in Scotland and what types of waste it is composed of. Information on the size of the flytipping problem in Scotland and the estimation methodology applied are already presented in detail in ZWS's report *Scotland's Litter Problem*⁴. We follow this methodology to ensure consistency. We also present data collected through the new FlyMapper database. As there is still little or no data available for flytipping on private land, the report focuses on local authority land only.

Section 4 summarises findings from ZWS's litter report regarding the direct and indirect cost flytipping imposes on society. The costs presented are based on published research commissioned from Eunomia, *Exploring the Indirect Cost of Litter in Scotland*. This report is still the most recent source of evidence. We present the flytipping-related findings here again for completeness.

³ Dumb Dumpers, *What is Flytipping*, <http://www.dumbdumpers.org/what-is-flytipping/> (last accessed: 18/9/ 2016)

⁴ See Section 3 and Appendix 1 in *Scotland's Litter Problem* (ZWS, 2013). This report is referred to as "ZWS's litter report" throughout this report.

Section 5 looks at the perception of flytipping by the public. This section draws heavily on a flytipping survey commissioned from Icaro. This survey work is referred to as the “ZWS flytipping survey” throughout this report. The section also draws on other sources for additional insight.

Section 6 reviews our understanding of the causes of flytipping and considers both who commits acts of flytipping and how these are motivated. As people who commit acts of flytipping can be allocated to two distinct groups – households/small businesses and ‘organised’ offenders – with differing, distinct motivations, we consider these groups separately. Section 6 also considers what can be done to change behaviour and prevent flytipping. We look separately at possibilities to influence household behaviour and ‘organised’ offender behaviour to take account of the varying drivers that motivate them. For each group, we consider the main countermeasures – raising awareness, improving infrastructure and intensifying enforcement – that are already practiced both within and outwith Scotland. This section draws on knowledge that we hold as an organisation⁵ or that is evidenced in the literature. We highlight where we identify opportunity for further research to close gaps in our understanding of how flytipping can be tackled effectively.

⁵ Apart from ZWS’s litter report, these include best-practice guidance and intervention projects reports.

3 How big is Scotland’s flytipping problem?

As highlighted in ZWS’s litter report, quantifying the amount of flytipping occurring in Scotland is challenging. Flytipping does not occur in single locations where it can be easily measured. And there are a number of ways to measure it: item counts, weight counts or incident counts. Even an incident count, which appears a straight forward measure, can be challenging where several actors contribute to a flytipping hotspot. It can be difficult to disentangle whether the deposit site depicts several (and how many) separate flytipping incidents. Consequently, recording organisations (such as local authorities) have adopted different processes to measure and record flytipping. In addition, a large proportion of flytipping occurs on private land – flytipping is regarded a major problem by over three-quarters of private landowners and over two-thirds of farmers⁶ – and remains largely unrecorded⁷.

In 2015, there were three main flytipping reporting systems available to local authorities in Scotland: Waste Data Flow, Flycapture and Flymapper. WasteDataFlow is Scotland’s national waste database which captures the tonnage arisings from flytipping and the number of incidents per annum⁸ by local authority. However, local authorities also record some flytipping waste in other Waste Data Flow categories where it makes sense operationally to combine waste during collection. Hence, the information on Waste Data Flow is unlikely to show a complete picture of the problem on local authority land. Additionally, some local authorities did not report any flytipping to Waste Data Flow at all during this period; this is unlikely to represent a genuine absence of flytipping in these areas.

The Flycapture database was used by about half of the local authorities in Scotland with varying degrees of consistency. Flycapture closed in spring 2016. With the system closure approaching and the parallel launch of FlyMapper in 2015, the number of local authorities reporting to Flycapture decreased notably in the final year of its availability.

The third reporting system, FlyMapper, is a free tool for local authorities and land owners to voluntarily report and monitor flytipping, and is administered by ZWS. FlyMapper has the significant benefit over previous reporting systems that it maps incidents by location; however it has not yet been operationalised by all local authorities. Therefore at this stage, while the number of users has increased since its launch in 2015 it does not currently deliver a complete picture of flytipping incidents in Scotland. FlyMapper would be our preferred single source for flytipping estimates going forward.

Apart from these three reporting systems, a number of local authorities also use their own reporting tools that may feed into any of the above. Additionally, some local authorities employ LEAMS, a performance indicator and audit system of street cleanliness for local authorities in Scotland, to record some of the flytipping they experience on their land. However, LEAMS is a measure of local authority performance not of waste volumes and composition.

Table 1 below provides an overview of the reporting systems discussed above. The information presented in Section 3.1 is based on data from Waste Data Flow, Flycapture and FlyMapper.

Flytipping reporting systems	Description of the service
Waste Data Flow	Mandatory, local authorities reporting to SEPA based on tonnage and number of incidents only; completion level is of variable quality

⁶ Tackling Flytipping. A guide for landowners and land managers (National Flytipping Prevention group, 2006)

⁷ It is the landowners’ responsibility to clean up items flytipped on their land at their own cost and effort. Where land is rented or leased, e.g. on commercial premises, licensing conditions that are part of the rental or lease contract commonly specify who has responsibility to maintain the cleanliness of the land. Where they bear the costs of clean-up, landowners might not have an incentive to undertake clean up and, thus, fail to report flytipping when it has occurred. Therefore we have only a very incomplete picture of the scale of flytipping on private land in Scotland.

⁸ This is a change from the previous quarterly reporting of flytipping data (up to and including 2012).

Flycapture (discontinued in spring 2016)	UK system which is voluntary for local authorities in Scotland to use; Information on number, waste type, location type and volume of incidents entered at aggregated level for reporting period.
FlyMapper	Scottish system which is voluntary for local authorities to use; Information on number, type, volume and geographic location of incidents entered on case by case basis; feeds directly into a central database, but can also be used at the operational level by local authorities
LA's own datasets	May inform Waste Data Flow and/or Flycapture (up to 2016), as well as operational decisions
Data from other incident reporting systems	Primarily this is public reports of flytipping. The public will only report incidents that are seen – and some may be reported multiple times. Thus this data is not used for national estimates of volumes. E.g. Dumb Dumpers Helpline; incidents passed locally to councils for a response

Table 1 Summary of flytipping reporting systems in Scotland

3.1 How much flytipping is there in Scotland?

The exact size of the problem of flytipping in Scotland is not known because comprehensive flytipping data does not exist. ZWS's 2013 litter report estimated that at least 26,756 tonnes of waste was illegally flytipped each year and dealt with by local authorities, with an estimated 61,227 incidents occurring⁹.

It is not possible to make a robust statement about *trends* in flytipping levels over time. Incident level data in the reporting systems Waste Data Flow and Flycapture appears to show a declining trend (Figure 1). It is not evident whether this decline depicts an actual decline of flytipping incidents or merely a change in reporting practices. Due to the recent changes in all reporting systems it is likely that the trend we see in the data is misleading and does not fully reflect actual incident numbers.

⁹ To inform the litter report, ZWS commissioned a survey of local authorities in 2012, conducted by Eunomia, in order to better understand what the different data sources are telling us of the actual size of the problems of litter and flytipping. Eunomia developed a methodology to estimate the total number of incidents, composition and tonnage of both litter and flytipping in Scotland. Their estimation methodology is detailed in section 3 and the appendix in *Scotland's Litter Problem* (ZWS, 2013). In this section, we update and compare their findings with recent data following the same methodology where possible.

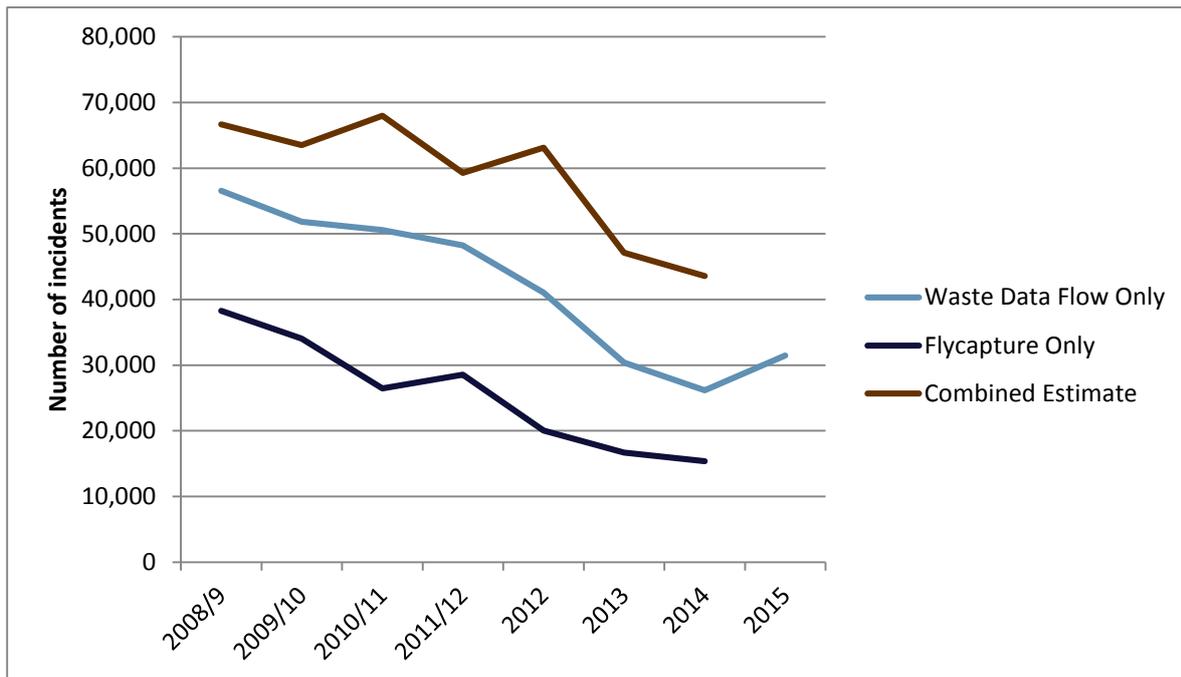


Figure 1 Number of flytipping incidents – trend over time

The combined estimate of flytipping incidents up to the year 2011/12 (see Figure 1) broadly follows the methodology laid out in ZWS’s litter report. The combined estimate thereafter depicts the simple sum of incidents reported to WasteDataFlow and Flycapture. This might be an overestimate where local authorities reported to both WasteDataFlow and Flycapture and incident numbers might potentially be double-counted. At the same time, a number of local authorities reported to neither recording system, or not on a regular basis, and the flytipping they experienced is not included above.

In future, data quality is expected to improve as an increasing number of local authorities and other landowners record flytipping incidents using the FlyMapper reporting system. Flymapper enables the geographical tracking of flytipping incidents and keeps a record of composition and size. Flymapper feeds directly into a central database. Going forward, this will improve our understanding of the nature of flytipping that occurs and can aid prevention and enforcement measures at both local and national level.

3.2 What waste types is flytipping made of?

Flytipping incidents vary significantly in the size and types of waste deposited, from a single black bag of household waste to large quantities of construction waste. Figure 2 provides an overview of the most frequently flytipped waste types adapted from ZWS’s 2013 litter report. This is compared with more recent information recorded on FlyMapper and shown in Figure 3.

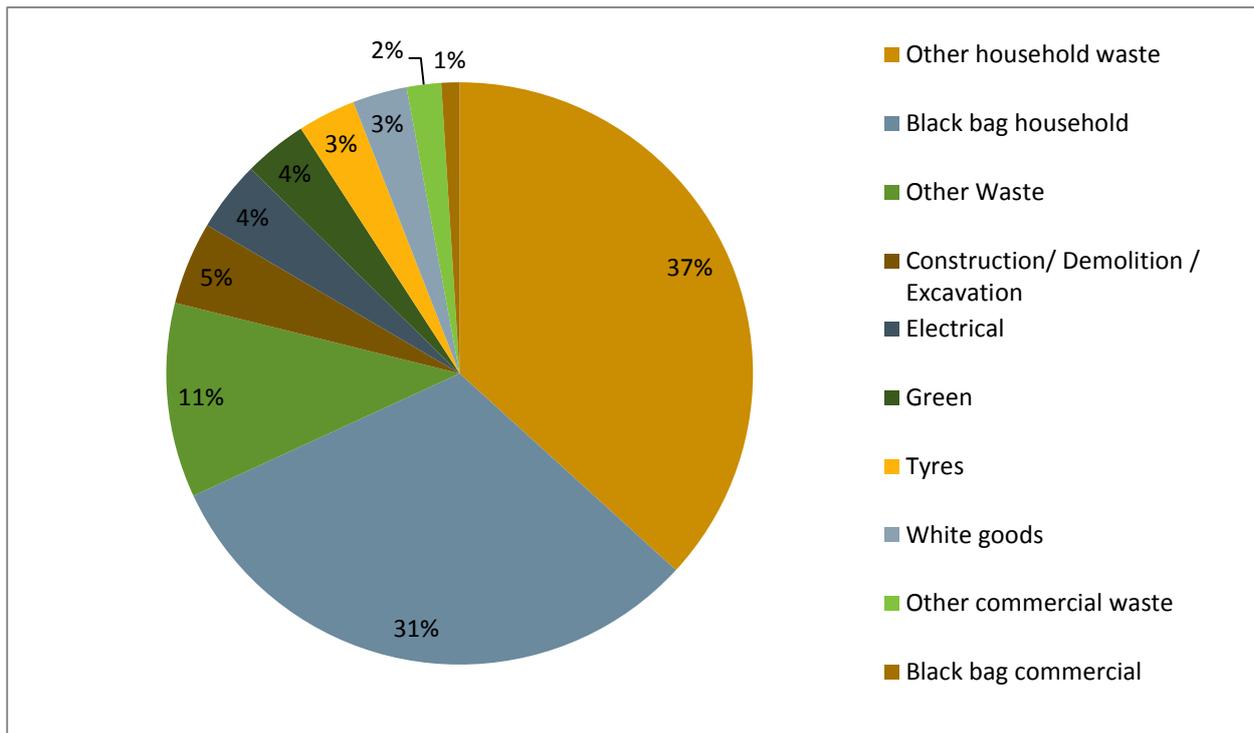


Figure 2 Frequency of flytipping incidents by waste type recorded in Flycapture (Diagram based on a sample of 28,546 incidents recorded in 2011/12, adapted from ZWS's litter report)

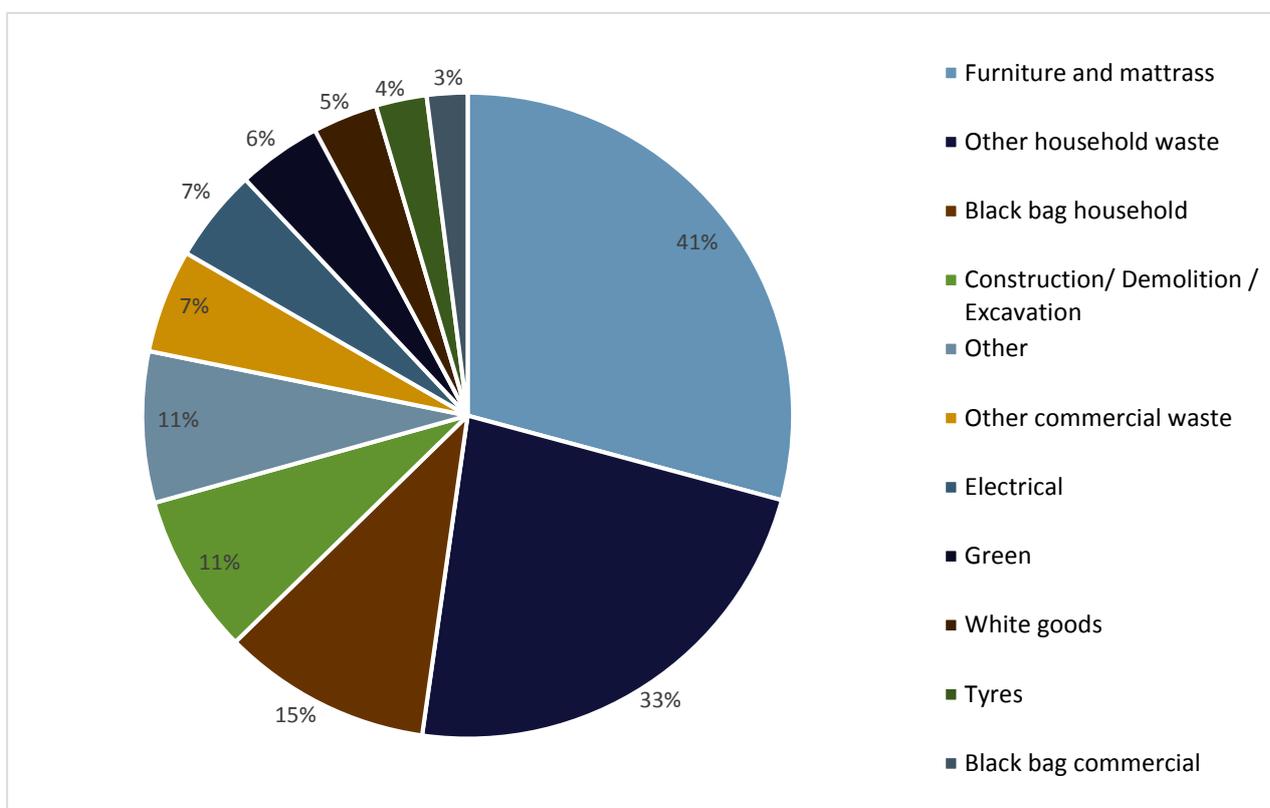


Figure 3 Frequency of flytipping incidents by waste type recorded in Flymapper (Diagram based on a sample of 11,786 incidents)

The above two diagrams suggests that household waste is the most frequently flytipped waste in Scotland. This category will also include waste from other sources with the “mixed” aspect of household waste often deposited in black bin bags and some of this can also arise from business sources. Additionally, household waste will not always be dumped directly by householders; a third party may sometimes be involved.

A prevalence of household type waste in flytipping is also evident in that it is the waste type the public recalls seeing flytipped most frequently. In 2014/15, ZWS conducted a flytipping survey with a nationally representative sample of 1,500 adults in Scotland. General household waste was the type of flytipped waste that was most frequently observed (see Figure 4). Other flytipped waste types frequently recalled, such as mattresses, sofas and carpets, are also likely to have originated from households.

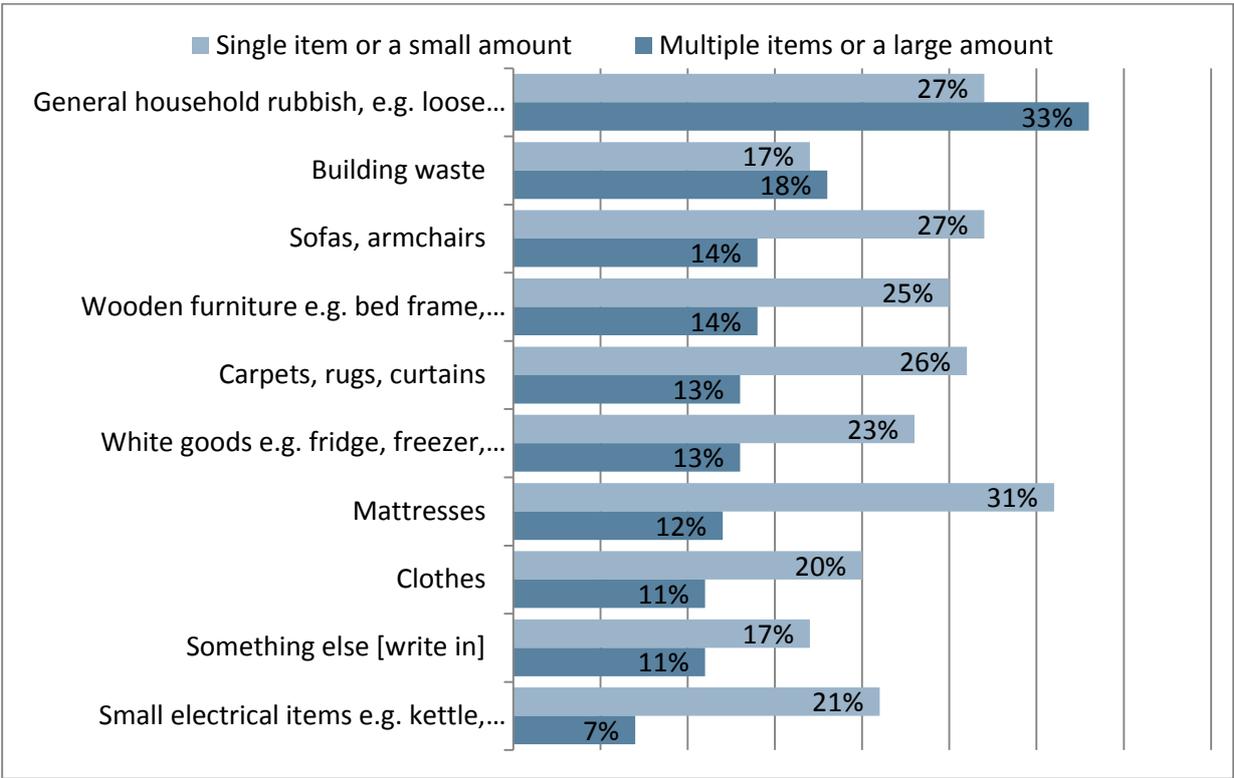


Figure 4 Response to flytipping survey question “Thinking about the incident, what was tipped?” (Diagram based on a sample of 420 respondents who have witnessed at least one incident of flytipping)

While the frequent deposit of household waste items might lead to the conclusion that most flytipping is undertaken by householders themselves, this is not likely to be true (though this does happen). The size of waste deposits reported to Flycapture and FlyMapper (shown in Figure 5 and Figure 6) indicate that at least 43% of flytipping incidents require the use of a van or larger vehicle to transport the items.

It should be noted that incident size recording is dependent on the subjective judgement by the operational staff logging the incident, and that it is also possible to adjust cars (e.g. by putting down the back seats) to enlarge its space to transport items, so the ‘size’ measure might be applied with some degree of variation by individuals. But overall, the majority of van or larger vehicle sized incidents are believed too large to have been committed by individual householders and imply a higher degree of organisation. Waste may have been collected by someone without a legitimate waste carrier’s licence and disposed of illegally without the householder’s knowledge (see Section 6).

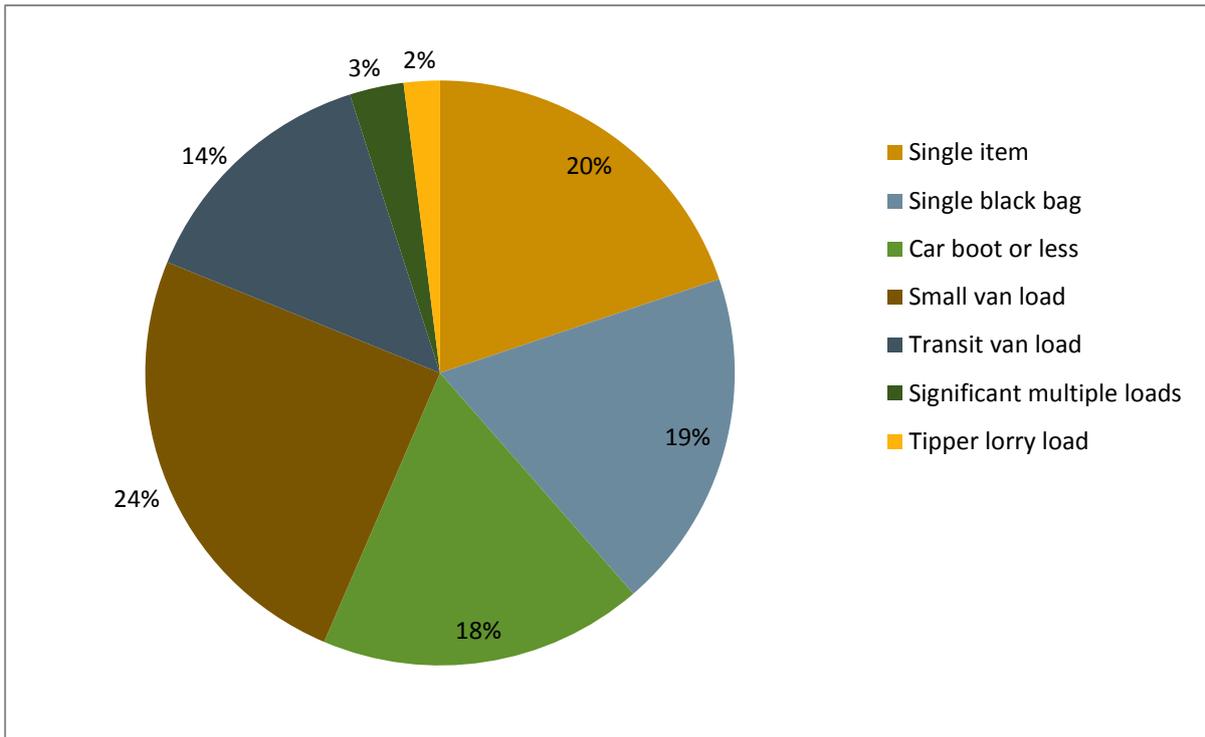


Figure 5 Frequency of flytipping incidents by size recorded in Flycapture (Diagram based on a sample of 28,546 incidents recorded in 2011/12 adapted from ZWS's litter report)

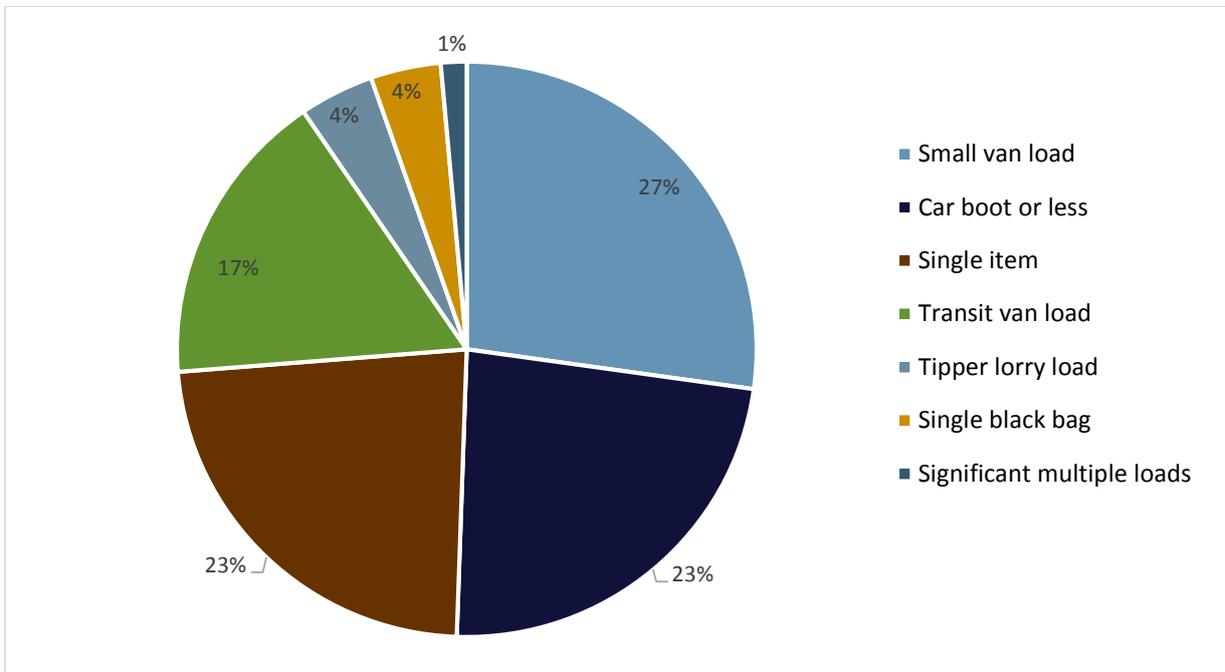


Figure 6 Frequency of flytipping incidents by size recorded in FlyMapper (Diagram based on a sample of 16,651 incidents)

Deposit incidents of a size requiring a van or larger vehicle for transport weigh much more than the smaller incidents recorded. They therefore account for a much greater share of the total tonnage of

flytipping than is implied simply by counting the number of incidents. ZWS's litter report suggests a methodology¹⁰ to estimate the likely tonnage associated with the different incident size categories. We apply this methodology to the FlyMapper data presented in figure 6. Results are shown in Figure 7.

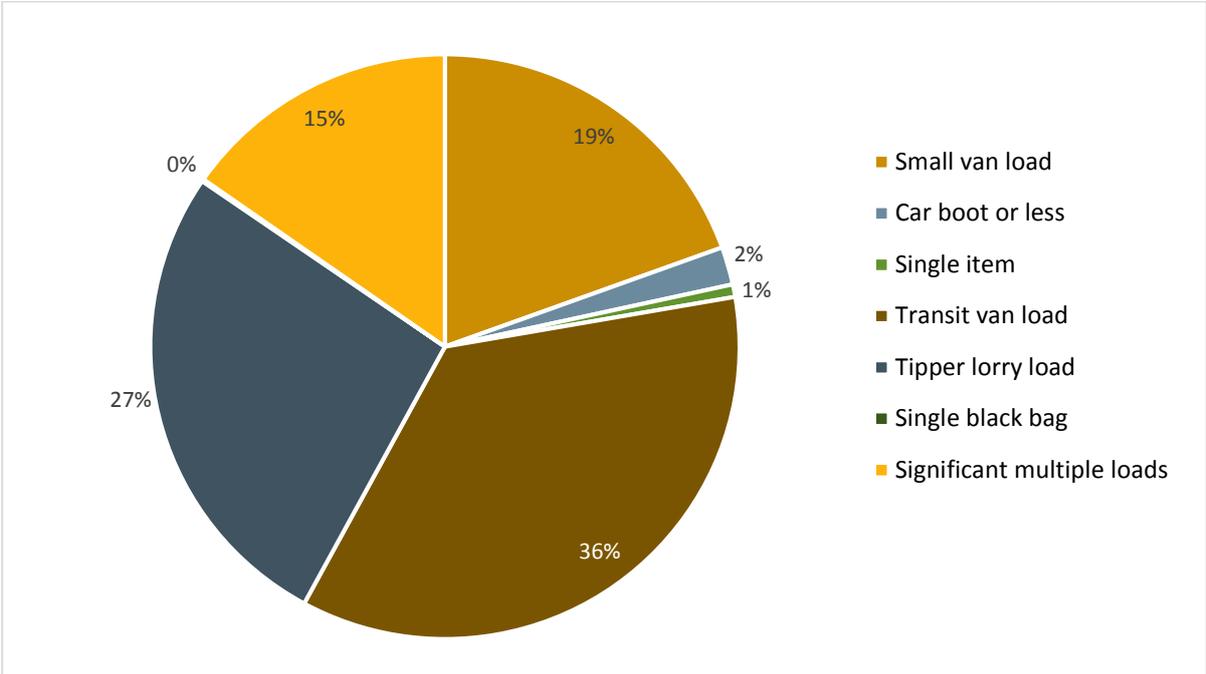


Figure 7 Distribution of weight by incident size category (Diagram based on a sample of 16,651 incidents recorded in FlyMapper with a total tonnage estimate of 7,811t)

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. This is consistent with the findings in ZWS's 2013 litter report, which relied on pre-Flymapper data collection.

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. Additionally, the large number of scattered small incidents sets an operational challenge to recording and clearing them all, increasing the likelihood that the actual number of incidents is more underreported than that of larger scale incidents.

However, it seems still 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.

3.3 Where does flytipping occur?

Incidents of flytipping occur almost anywhere; in urban, sub-urban and rural areas and on private as well as public land. Hotspots include verges of country lanes, road sides and urban gap sites. Areas of high population density are generally related to a higher number of flytipping incidents. Per head of population there is, however, no significant difference between flytipping in urban and rural areas.

Flycapture kept a record of flytipping location of incidents cleared by local authorities. Results for the year 2011/12 are shown in Figure 8. Unsurprisingly, almost half of the incidents recorded were located on council land. Other frequent locations are highways (29%) and footpaths (15%). As with any

¹⁰ For details, see the appendix in *Scotland's Litter Problem* (ZWS, 2013).

incomplete recording, data might be skewed towards areas that local authorities prioritise as potential hotspots or simply because of a higher presence of operational staff to capture incidents in particular places.

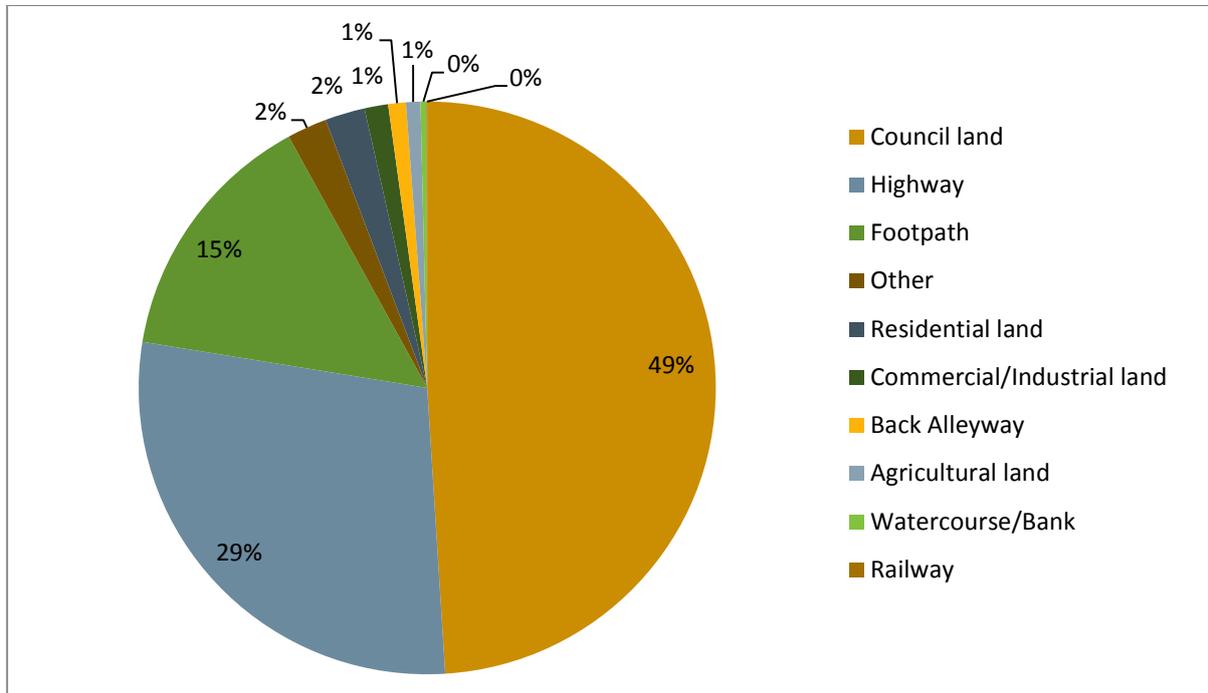


Figure 8 Flytipping locations (Diagram based on a sample of 28,546 incidents recorded in Flycapture in 2011/12)

In its 2014 flytipping survey, ZWS asked respondents who had observed flytipping to specify the location of their sighting. The side of the road (19%) and on the street (19%) were the most common responses (see figure 9). Other common locations included bin stores at a block of flats or tenements (15%) and the countryside (14%).

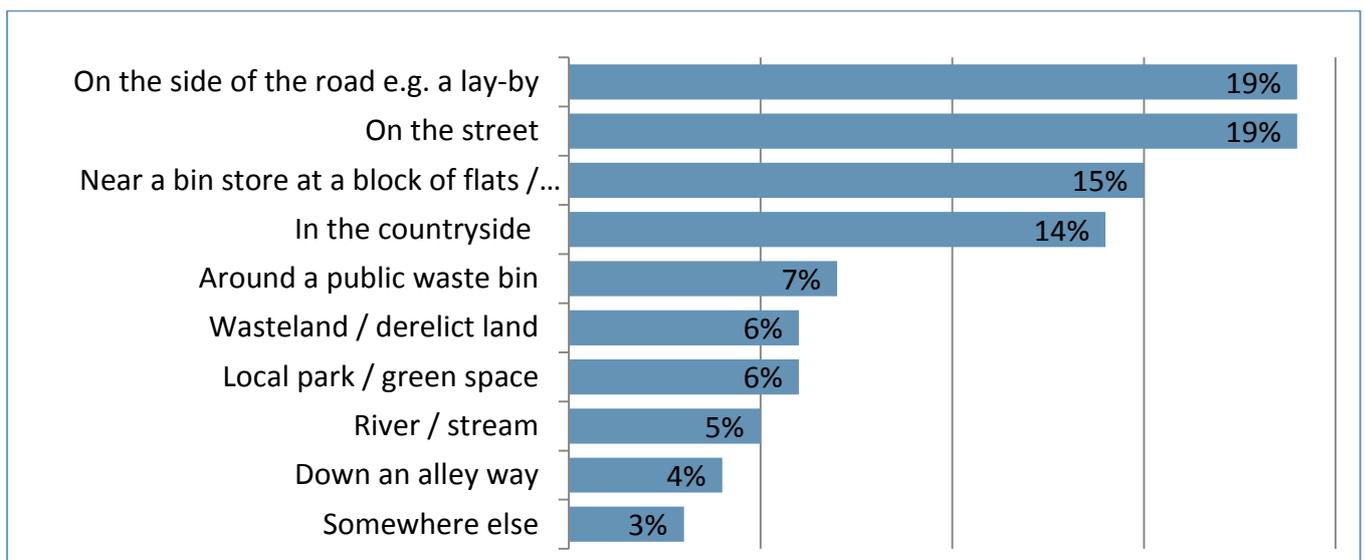


Figure 9 Response to flytipping survey question “Where were the items?” (Diagram based on a sample of 420 respondents who have witnessed at least one incident of flytipping)

Respondents were also asked whether they had, in the year prior to being surveyed, observed incidents of flytipped waste in and around the area where they live. 40% of respondents (of a sample of 1,500) had never seen any flytipping in their neighbourhood. Built up urban areas reported the highest levels of incidents in the last year (40%). 'Suburbs' and 'village centres' were the lowest at 23%. Areas defined as 'very rural' report a higher level of incidence at 33%.

45% of those living in 'rough' or 'struggling'¹¹ areas had seen an incident in the last year compared to only 20% of those in 'well-off' areas and 25% of those in 'middling' areas. Respondents living in tenements or flats were more likely than those in semi or detached house to have seen flytipping in the previous year (35% vs. 24%).

¹¹ Respondents were asked which of the five terms best described their neighbourhood: "Struggling / in decline"; "Rough around the edges"; "Middling"; "Well-off"; "Exclusive". The reason for using this informal labelling system was so that respondents could *self-identify* their own neighbourhood – it is therefore a subjective measure of perception, rather than an objective socio-economic classification.

4 What does flytipping cost Scottish society?

Flytipping imposes significant financial cost to the public purse and to private landowners. ZWS's litter report estimates both the direct and indirect costs of flytipping¹². We summarise key results in this section and refer the reader to the original report for more detail. Additionally, we present cost estimates from other reports for comparison. While the precise costs associated with flytipping are difficult to identify with confidence, all these sources support the case that flytipping imposes significant costs on society.

Direct costs of flytipping are related to a range of impacts: the clearance, investigation and prosecution of flytipping incidents, the implementation of prevention measures and the loss of business for (and in turn taxes from) legitimate carriers.

A waste crime report by Eunomia¹³ estimates the cost of flytipping incidents to local authorities in the UK to be between £103m and £270m annually, making up around a third of the cost of waste crime to the UK economy. The National Flytipping Prevention Group suggest a slightly lower estimates of between £86m and £186m for the investigation and clearance of flytipping incidents on both private and public land in the UK¹⁴.

Conducting research to inform ZWS's litter report in 2013, Eunomia estimated a comparable cost of £8.9m per a year to Scottish local authorities related to the clearance and disposal of flytipped waste, and at least a further £0.1m to national public bodies. A further £2m are spent by local authorities on enforcement activities. These costs do not include expenses for the investigation and prosecution of large scale and serial flytipping offences, dealt with as serious waste crimes by either the Scottish Environmental Protection Agency or the police. ZWS's litter report estimates a further expenditure by local authority of at least £1.7 million on education and awareness campaigns. Though this estimate includes costs of both litter and flytipping campaigns with a significantly higher, though not clear cut, expenditure on anti-litter campaigns. This adds up to a Scottish total direct cost of at least £11m.

The cost of clearing up and preventing flytipping on private land in Scotland are not known, but are presumed to be considerable. For instance, the UK Woodland Trust alone has recently reported spending over £42,000 on clearing up just under 200 incidents of flytipped waste in 2016¹⁵. Not including private land in Scotland, the Country Land and Business Association (CLA), a membership organisation for owners of land, property and business in England and Wales, has estimated that it costs its members up to £150m each year to clean up flytipping on private land¹⁶.

Flytipping also incurs significant indirect costs. For instance, flytipping has a negative effect on property values in areas where flytipping is prevalent and lowers the willingness to invest in them¹⁷. Increased crime rates and mental health problems are other side-effects that are linked both to flytipping as well as other social and environmental problems. These problems are often interrelated. According to the 'broken-windows' theory, where an original damage – e.g. a broken window, or in the case of flytipping a single black bag dumped – is not rectified (or removed) quickly, this sends a signal to offenders that no-one cares about the area and it is free to 'trash'¹⁸. Additionally, a very visible

¹² See Section 4 in *Scotland's Litter Problem* (ZWS, 2013).

¹³ See http://www.esauk.org/esa_reports/ESAET_Waste_Crime_Tackling_Britains_Dirty_Secret_LIVE.pdf (2014). This cost does not include flytipping on private land and "dramatically understates the true cost" of flytipping (ibid.).

¹⁴ <http://www.tacklingflytipping.com/aboutfly-tipping/1474>

¹⁵ See <https://www.theguardian.com/environment/2017/jan/03/woodland-trust-sees-worst-year-for-flytipping-on-record>

¹⁶ ESAET (2017)

¹⁷ Webb et al. (2006)

¹⁸ Ibid.

offense such as fly-tipping in a community may increase residents' fear of anti-social behaviour and crime in their community more generally which may impact their mental well-being, among others¹⁹. There are other, even less tangible, consequences of flytipping that impose a more hidden financial burden that is difficult to quantify. People value a clean environment and flytipping can adversely impact people's quality of life. The related social disamenity cost can be considerable, but is difficult to monetise with a high degree of certainty.

Wardman et al. (2011) conducted a study asking people to rank environmental factors that impacted their quality of life. The study estimated values respondents were willing to pay in order to achieve an improvement of various environmental factors in their neighbourhood. The Wardman study found that people placed the highest value on tackling litter followed by tackling fly-tipping. Eunomia used this valuation as a basis to derive a social disamenity of litter cost estimate of between £73m and £770m. The wide range of these two values is indicative of the high uncertainty of monetising social disamenity but even the low end of this range would indicate very significant impacts. This is discussed further in ZWS's litter report.

Apart from Wardman et al. (2011), there is other evidence that the disamenity caused by flytipping is similar to that of litter. In 2009, Keep Britain Tidy (KBT) published results of a London-based survey²⁰ in which respondents were asked to respectively rate flytipping and littering in their neighbourhood. The results showed that 44% of respondents regarded fly-tipping as either a 'major problem' or 'to some extent' a problem. This compared to 61% for litter. Yet, a larger share of respondents agreed that it was 'extremely important' that money was spent to tackle flytipping (44%) compared to tackling litter (36%). In total, 67% agreed that it was (either extremely or somewhat) important to spend money to tackle flytipping, roughly equalling spending money to tackle litter (65%).

To inform this report, a social disamenity cost estimate for flytipping was calculated based on the willingness-to-pay to tackle flytipping based on Wardman et al. (2011) and following largely Eunomia's estimation methodology. This returned an estimate of more than £100m. This estimate, though very high, appears credible and is consistent with estimates elsewhere²¹. Combined with survey data, it is primarily another strong indication that people do – or should – highly value a flytipping-free environment.

Where flytipped waste includes hazardous substances, flytipping threatens our ecosystem and wildlife and may even depict a risk to human life²². Monetising the costs of these has not been attempted as the data required for such an analysis is not readily available; and, lack of data notwithstanding, it is arguably the direct impacts, rather than monetised costs, that would make these issues most salient.

Finally, additional indirect cost arise from the lost value of flytipped items that could have been reused or recycled. The value of this flytipped waste is difficult to calculate, as detail on its composition is not well-known. Some local authorities in the UK are seeking to extract material from flytipped waste that is suitable for recycling to reduce their clearance costs. And many flytipped items such as furniture or fridges might also have been suitable for reuse and repair had they been disposed of legitimately²³. In

¹⁹ Ibid.

²⁰ <http://kb.keepbritaintidy.org/flytipping/Content/FactsandFigures/Public%20Perception.pdf>

²¹ The 'true' social disamenity cost will remain uncertain, and the value presented here is dependent on the specific context in which the average willingness-to-pay to tackle flytipping was derived in Wardman et al. (2011). In the original Wardman et al. (2011) study, respondents were asked to consider the specific problem of household items dumped in a street in their neighbourhood. A different flytipping problem context would very likely have returned a potentially quite different average willingness-to-pay to tackle flytipping.

²² While no actual cases of flytipping having posed a direct threat to a human life has been reported in the UK, this risk is very genuine. A well-documented case at hand is the surge of cancer cases (and related deaths) in the Italian province of Campania due to large-scale illegal dumping of toxic waste.

²³ A WRAP (2012) study found that just over half of the bulky waste items taken to a household waste recycling centres are re-usable as they are, or after slight repair.

many cases this value will be lost to the economy as flytipped waste may have been damaged during transport and disposal and is exposed to weather conditions.

5 How is flytipping perceived by the public?

As discussed in section 4, the public generally values a flytipping-free environment. As flytipping is very context specific, it is useful to look in more detail at how flytipping is perceived in the various contexts.

For this purpose, ZWS commissioned a survey on flytipping perceptions with Icaro in November 2014. The results are presented in the following sub-section, followed by a more general discussion of flytipping perception in relation to other local environmental and social quality issues based on the Scottish Household Survey.

5.1 Insights from ZWS flytipping survey

Icaro conducted a nationally representative online survey of 1,500 Scottish adults in November 2014 to gain better insights into flytipping perceptions of the Scottish public.

Among eight anti-social/local environmental quality issues that respondents were asked about, flytipping was a mid-ranking issue. 4% of Scottish residents say that it was 'very common' in their area, while a further 12% say it was 'fairly common'. By contrast, 83% said flytipping was 'not at all' or 'not very common' in their area. For comparison, the frequently cited issues were animal nuisance/dog fouling and rubbish/litter lying around. In fact, the majority of Scottish people (72%) have not seen any flytipping in the past year, with 40% having never seen flytipping at all.

One of the aims of the survey was to assess whether different kinds of flytipping incidents were perceived in different ways by the public and whether there were cases that were not defined as flytipping at all. To do this, respondents were presented different specific flytipping scenarios and asked to rate the severity of the incident.

A main finding was that the public's perception of flytipping indeed significantly depends on the exact context of the incident, including what has been tipped, where it has been tipped and the quantity.

Flytipping in more "natural" environments was found to be far more emotive than in urban ones. For example, a roll of carpet is perceived very differently when it is improperly placed in a bin store, compared to when it is dumped in a river. Just less than four in ten (39%) categorise a carpet in a bin store as serious flytipping; this compares to double that number (78%) who say it is serious when it is in a river.

Likewise, bigger items were found to be more emotive than smaller ones when dumped in the same location. For example, 19% categorise a T-shirt as serious flytipping when dumped in a river, 34% say the same for a kettle, while 85% think a washing machine in a river is a serious act of flytipping. The complete results are shown in Figure 10.

The impact of the quantity dumped was also found to significantly impact perception: Comparing 'a single bag of rubbish' to 'a few bags of rubbish' across different locations, the findings showed that the higher quantity makes the incident around twice as serious. For instance, 19% say a single bag is very serious when it is in a lay-by while 44% say the same for a few bags; 24% vs. 42% in the countryside; 37% vs. 59% in a river.

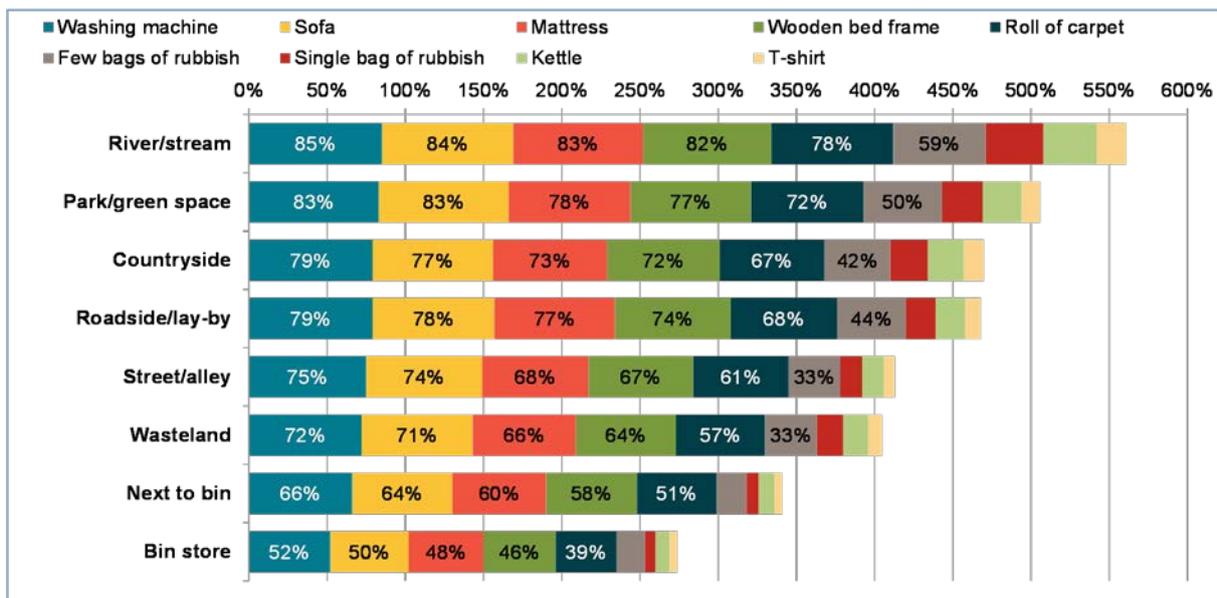


Figure 10 Severity of flytipping by item and location (Graph shows % of people rating each scenario of a particular item dumped in a specific location as “serious flytipping”. Split sample A for bin store, park, road, river (746) and B for countryside, bin, alley, wasteland (754), ZWS flytipping survey, 2014/15)

Rather than defining specific acts of flytipping as ‘serious’ or ‘not serious’ respondents were given the option to define them as acts of ‘minor flytipping’, ‘littering’ or neither. Scenarios of big items being dumped were usually considered flytipping. However, smaller items, like a T-Shirt or even single bags of rubbish, being dumped are as frequently regarded acts of littering or nothing as it is regarded as flytipping. For instance, a majority of 62% would categorise a T-shirt found in a bin-store as an act of littering or nothing rather than an act of flytipping.

Again, location also mattered for this definition. Being left in a bin store or next to a bin, an item is more likely seen as littering, compared to more emotive places like a river or park, where it is more likely seen as flytipping. For instance 33% of people say a single bag of rubbish was littering when it is dumped next to a bin, whereas only 12% say the same when the same item is dumped in a river. Additionally, up to a quarter of respondents regard certain acts of dumping waste items neither as littering nor flytipping, but as essentially acceptable. For instance, 24% of respondents considered it neither as littering nor flytipping to place a single bag of rubbish next to a bin or bin store. The specific phrasing of the question in the survey²⁴ invites the respondent to express a subjective opinion. It is therefore ambiguous whether to conclude from these results that a general misconception of what constitutes flytipping (by legal definition) is prevalent in the Scottish population.

Further support that people don’t always correctly distinguish some acts of flytipping from littering can be found in focus groups contributions that were observed in a litter research piece commissioned by ZWS²⁵ to inform the litter report. Prompted discussions about litter in the countryside and roadside frequently returned responses involving flytipping. In a practical sorting exercise, participants found some waste types difficult to categorise as litter or flytip. Other waste types, like furniture, household appliances and construction waste dumped in any location, were always identified as flytipping.

²⁴ “If you saw the following items [insert location], would you say that was... serious flytipping; moderately bad flytipping; flytipping but fairly minor; littering; none of those?”

²⁵ ZWS (2015)

5.2 Additional insights on flytipping perceptions

A number of other sources provide some additional insight in flytipping perceptions of the Scottish public.

The annual Scottish Household Survey (SHS) captures people's litter perception in Scotland. Roughly just over one in four people in Scotland consider rubbish and litter as 'very common' or 'fairly common' in their neighbourhood in the SHSs of recent years (Figure 11). As this report highlighted in Section 4, people's litter perception can be regarded a fair indicator of their perception of the flytipping problem. Figure 11 might therefore give some further insight into how common flytipping is perceived to be in Scotland. The percentage of respondents stating litter (and therefore arguably flytipping) to be relatively common in their neighbourhood is almost identical to the figures from ZWS's flytipping survey where just over one in four (28%) respondents stated have seen a flytipping incident in the past year.

According to the SHS (2015), large urban areas report slightly higher litter occurrences, with 37% stating rubbish and litter are 'very common' or 'fairly common' in their neighbourhood, making it the most commonly reported problem in the sub-category.

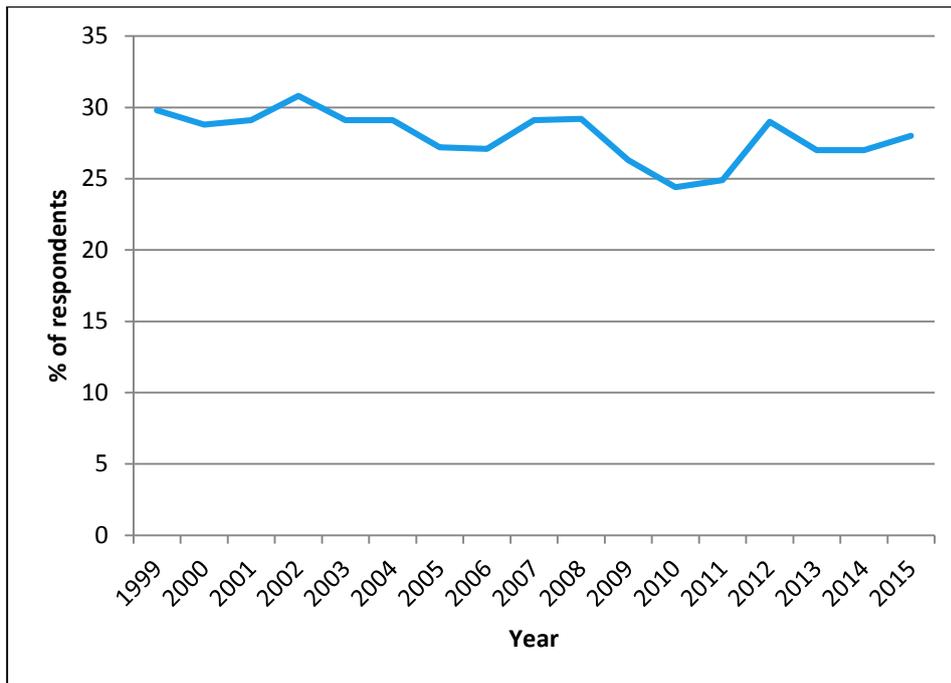


Figure 11 Graph based on Scottish Household Survey data: Rubbish and litter lying around 'very common' or 'fairly common' (1999-2015²⁶)

ZWS's qualitative litter insight research work²⁷ also covered to some degree respondent's perceptions of flytipping. Respondents felt that flytipping was socially unacceptable in residential areas, but also particularly annoying in the countryside - both by those who live there and others who pass through – and evoked strong responses.

²⁶ <http://www.gov.scot/Resource/0050/00506173.pdf>

²⁷ ZWS (2015)

A small number of participants reported they do regularly experience disamenity from litter, flytipping and dog fouling where they live, including those from more deprived areas. This pattern is in line with SHS findings around litter and dog fouling being more prevalent in deprived areas.

Respondents judged flytipping behaviour different from littering behaviour because of the intent they assumed behind it. The deliberateness and forethought made it flytipping behaviour feel particularly outrageous. Moreover, flytipping was a common concern to respondents because of the anticipated impact it has on the visual state of the local neighbourhood and the risk of attracting other problems such as vandalism, vermin or more litter.

Somewhat in contradiction to flytipping being perceived as unacceptable by a large part of the public, a recent Ipsos MORI survey, commissioned by Keep Britain Tidy, of 1,133 adults aged 18+ in England²⁸ found that 36% of people think it is acceptable to leave large household items they are looking to get rid of such as a sofa or washing machine or rubbish from home improvement work in a way that is, legally, classed as fly-tipping²⁹. Specifically, leaving these items in a public place was considered acceptable 'If the Council takes the items away quickly' (12%), and 'If you know the Council or a scrap dealer comes by regularly to take stuff away' (12%). This highlights a challenging situation for local authorities: On the one hand, leaving flytipped items too long on the streets might lead to an uptake of similar behaviour by peers who may believe this is acceptable conduct ('broken window' theory). At the same time, clearing flytipped items quickly appears to also lead to incorrect conclusions by some parts of the population that flytipping unwanted household items is acceptable. These and similar difficulties in developing a strategy to effectively address flytipping will be discussed further in the following section.

²⁸ Research was undertaken by Ipsos MORI between 3 and 28 September 2016 using CAPIbus, Ipsos MORI's computer aided face to face in-home omnibus survey with 1,133 adults aged 18 and over in England. Data have been weighted by age, gender, region, working status, social grade, tenure and ethnicity to the known population profile of adults aged 18+ in England

²⁹ <http://www.keepbritaintidy.org/new-action-plan-to-tackle-fly-tipping-launches/2756/2/1/999/3>

A split sample approach was used for this question. Half were asked to name situations in which they felt it would be acceptable for people to leave large household items such as a sofa or washing machine, which they were looking to get rid in a public place. The other half of the sample were asked about people leaving items of rubbish from work carried out to improve their home in a public place.

6 What do we know about the causes of flytipping and how they can be addressed?

Flytipping incidents are characterised by a range of waste types, incident sizes and location profiles. Behind these different types of incidents can be quite differing motivations of the offending individuals and there are often specific contextual issues that will influence their behaviour. In this section we summarise our understanding of who commits flytipping, what motivates their behaviour and how it can be addressed. To inform this section, we draw on a range of sources and empirical examples from the UK and overseas³⁰.

6.1 Who commits flytipping?

It is in principle possible to distinguish between three sets of offenders: Private households who flytip typically small amounts of their own domestic waste, commercial businesses who also flytip comparatively small amounts of their own waste, and organised offenders who flytip waste that is likely to have originated with others, often on a larger scale. In the latter case, the party that generated the waste may or may not be aware that it is being disposed of illegally. All three groups are to some degree motivated by economic drivers: avoiding disposal fees or uplift costs are often assumed to be the underlying driver of most flytipping offences. But while gaining an economic advantage matters, it is usually a set of conditions that increase a person's willingness to commit a crime³¹. External (physical) and internal (subjective) factors need to be considered in combination to fully explain (and address) flytipping behaviour³².

In contrast to 'organised' offenders, households and commercial businesses tend to act opportunistically and are, in turn, more easily deterred by prevention measures³³. In the remainder of this section we therefore distinguish between households and commercial businesses on the one hand and 'organised' offenders on the other.

6.2 Why do households and commercial businesses flytip?

Small-scale, 'domestic' flytipping often involves items such as furniture, white goods, clothing, minor builders' rubble and other waste that is not usually collected by kerbside collection. A common perception is that both private households and commercial businesses flytip because it is convenient and doesn't cost them anything. However, what drives individuals to not only think about, but actually commit a flytipping offence is more complex and is thought to be related to a person's attitude and knowledge, the local environment where the household or business is situated and local waste service provisions. Empirical evidence about the exact role these factors play and how they interact is very limited.

In this sub-section we detail characteristics that are frequently mentioned to contribute to flytipping behaviour.

³⁰ References of the sources reviewed are shown in Section 8. Further detail on the review methodology and a summary of the individual sources can be requested from ZWS.

³¹ Webb et al. (2006)

³² St John (2013)

³³ Webb et al. (2006)

6.2.1 Local waste services

Local waste service provisions directly impact household's and small businesses' convenience to dispose of their waste and the cost related to it. It is generally accepted that where the local waste services in place impose a barrier to ease of access or affordability this might motivate flytipping. Examples of such barriers include³⁴:

- A *low number* of household waste recycling centres in a local authority,
- A *long distance* to the nearest household waste recycling centre,
- A *lack of transport* options to reach the household waste recycling centre (e.g. where access necessitates car ownership),
- Inconvenient *opening hours* of household waste recycling centres,
- Regulations *limiting free access* to household waste recycling centres,
- Provisions around the uplift of bulky waste, including cost, availability and promptness of the service, and
- Perceived adequacy of kerbside collection services.

Empirical evidence to support the extent to which these factors form barriers is limited. St John (2013) found that only 43% of respondents to their (representative) survey stated that their bulky and electronic waste collection services were adequate for their needs, with those finding the service inadequate being slightly more likely to admit to having flytipped waste before.

There is further anecdotal evidence to support the fact that local waste services affect flytipping levels. For instance, KBT found in a recent survey that 53% of local authorities, who state that flytipping is a major problem for them, think that changes including an increase in bulky waste charges and closing household waste recycling centres have contributed to increases in flytipping³⁵. This local authority perception is in line with the public's view on the acceptability of flytipping where local authorities charge for bulky uplifts. When asked in the ZWS flytipping survey why they thought people flytipped, 38% of respondents agreed that a bulky uplift service charged for by the council potentially reinforces people's flytipping behaviour. This was also flagged by ZWS's qualitative litter insight research work where a number of respondents saw a charge for bulky uplifts as both a cause of and (acceptable) excuse for flytipping behaviour³⁶.

This research provided further anecdotal evidence about the role of local waste service provisions more generally. A couple of participants (notably in two of the rural groups) highlighted that they were unable to take their own household items to the local recycling centre because their work vans are also their domestic vehicles and any commercially identifiable vehicles are banned. Across the groups more generally, small companies not being able to use recycling sites was mentioned as a cause of flytipping, with some sense of sympathy for those offending as a consequence. Participants were occasionally mystified as to why councils would want to discourage recycling by these businesses by excluding them from municipal recycling centres or charging them for entry³⁷.

Webb et al. (2006) also found that the speed with which local authorities can collect bulky waste may play an important role. For instance, households or businesses may be happier to pay for collection if the goods are taken quickly. The NSW EPA (2017) also recommends the provision of urgent collection services for residents who may be able to demonstrate a particular situation of need.

³⁴ Webb et al. (2006), NSW EPA (2015), Yamamoto & Yoshida (2014), St John (2013)

³⁵ <http://www.keepbritaintidy.org/new-action-plan-to-tackle-fly-tipping-launches/2756/2/1/999/3>

³⁶ ZWS (2015)

³⁷ Ibid.

However, there is currently no empirical evidence on the impact of variations in local service provisions on flytipping levels.

6.2.2 Local environment characteristics

Apart from local waste services, other local environment and physical characteristics are also frequently highlighted in the literature as factors influencing flytipping behaviour. Among these are³⁸:

- High population density,
- High levels of local economic deprivation,
- Low levels of a household's capacity to store waste until collection day,
- Low levels of cleanliness of the immediate local environment.

Webb et al. (2006) used Flycapture data for the UK and compared it with other local area statistics linked to economic development to gain insight into how these might be affecting fly-tipping levels. The findings should be treated cautiously as the Flycapture data they used was fairly limited, but it provides some interesting indications. The study also highlights that as the index of multiple deprivation used includes a variety of correlated measures (such as housing, income, education, health, crime and the living environment), it remains ultimately largely uncertain which factors that contribute to deprivation are associated with flytipping, and which are not. Nonetheless, Webb et al. (2006) found empirical evidence that "overcrowding"³⁹ is strongly associated with flytipping in urban areas. They found this relationship to be particularly prominent for the flytipping of black bags and bulky waste, including white goods. NSW EPA (2017) research also found that the perceived likelihood of being caught and fined was particularly low for residents of multi-unit dwellings.

ZWS's flytipping survey provides some supportive evidence to the link between local area statistics and flytipping. 45% of people living in 'rough' or 'struggling'⁴⁰ areas report seeing an incident of flytipping in the last year compared to 20% of people living in 'well-off' areas and 25% of those in 'middling' areas.

In support of high population density and a lack of storage capacity being significant factors that impact flytipping, ZWS's flytipping survey found that those living in tenements or flats are more likely than those in semi-detached or detached houses to have seen flytipping in the last year (35% vs. 24%). Similarly, 40% of people living in built up urban areas have seen an incident of flytipping in the last year, compared to only 23% of people living in 'suburbs' or a 'village centre'. However, 33% of people living in areas with a very low population density, i.e. those defined as 'very rural', have seen an incident of flytipping in the last year. This is in line with common flytipping locations identified in section 3, and suggests a non-linear relationship between population density and flytipping behaviour. However it is quite possible that people dumping waste in rural areas need not be people living in this neighbourhood.

In a similar vein, St John (2013) found that households reporting that they don't have sufficient capacity to store waste (which is likely correlated to those households being situated in overcrowded urban areas) are significantly more likely to have admitted to flytipping.

Matsumoto & Takeuchi (2011) also found some evidence of areas with high unemployment rates experiencing higher flytipping levels.

³⁸ Webb et al. (2006), Hodsman and Williams (2011), St John (2013)

³⁹ Exactly how the term "overcrowding" is defined is not further defined in the report. Population density is treated as a separate local environment characteristic in their analysis, so "overcrowding" is understood to be distinctly different, though likely highly correlated.

⁴⁰ Respondents were asked which of the five terms best described their neighbourhood: "Struggling / in decline"; "Rough around the edges"; "Middling"; "Well-off"; "Exclusive"

6.2.3 Attitude and knowledge

Interlinked with the drivers discussed above is a set of drivers that are related to an individual's attitude and knowledge, such as a person's perception of flytipping and their knowledge of flytipping related legislation. Research conducted by St John (2013) found that more than 80% of their survey respondents reported that they would feel guilty if they flytipped, and think that flytipping was not acceptable⁴¹. The study also found that flytipping offenders often have a low level of guilt related to their offence and depict a low level of disapproval of flytipping committed by others. They also found that offending individuals have no (or claim not to have any) knowledge of what constitutes flytipping or what their legal obligations are.

Claiming not to have known that it is illegal to flytip might, of course, also simply serve as an excuse that does not reflect the truth. A couple of studies have therefore been conducted to better understand the public's general knowledge of flytipping related obligations. One consistent finding across a number of studies is that the public's knowledge that flytipping is illegal is relatively high. People are also found to have generally a high level of knowledge of the existence and location of their nearest household waste recycling centre.

However, gaps in public knowledge exist which may impact the occurrence of flytipping. A main knowledge gap appears to be the household's or business' duty of care obligation when hiring a third party to dispose of their waste⁴². St John (2013) found that less than half of all respondents (36%) were aware that they have a duty of care obligation to ensure that those carrying out work on their house which involves the removal of waste are registered waste carriers. KBT's commissioned research came to a similar conclusion with 47% of respondents in England unaware of this obligation⁴³. ZWS's flytipping survey returned a similar result, finding that 54% of respondents believe that the payment of a third party devolved them of responsibility as to how the items are disposed of.

With regards to small commercial businesses, there is similar, though quite dated evidence of the same knowledge gap regarding their legal obligation. A 2002 survey by NetRegs⁴⁴ found that only just over half of the participants (54%) had heard of the 'Duty of Care' regulations, and only 17% could name three of its requirements.

Another potential knowledge gap identified from the various research pieces highlighted so far in this report is a lack of understanding that the placing of black bin bags (or other single items) next to a bin even on collection day constitutes flytipping. Where these are genuine knowledge gaps, the public's (contribution to) related flytipping offences is likely unintentional and awareness campaigns might help contribute to preventing these acts of flytipping.

Qualitative research conducted by the NSW EPA (2017) supports this notion in relation to kerbside dumping of reusable items. The research found that some residents of their focus groups were not aware that placing reusable items at kerbside is illegal. In fact, putting items for reuse at kerbside was not only considered socially acceptable, but even judged to be depicting socially and environmentally responsible behaviour, as the underlying intent is the reuse of the goods as opposed to disposing of them at landfill. While there is no evidence of this attitude in the Scotland, the promotion of free or low-cost routes to reuse (e.g. via the Reuse Phonenumber or reuse infrastructure at household waste recycling centres) might contribute to preventing flytipping occurrences that are similarly motivated.

⁴¹ In addition to this, NSW EPA (2015) research found that this perceived unacceptability is not dependent on a person's income.

⁴² Under the duty of care obligation, householders are required to ensure that the waste they produced on their property is passed on to a registered waste carrier and that they know where the waste is being taken for disposal.

⁴³ <http://www.keepbritaintidy.org/new-action-plan-to-tackle-fly-tipping-launches/2756/2/1/999/3>

⁴⁴ NetRegs (2002)

6.2.4 Household characteristics

Socio-demographic household characteristics, such as income, have been found not to be a significant factor for flytipping behaviour. For example, the NSW EPA (2015) found that flytipping offenders are not characterised as having low incomes or a lower level of formal education. They found non-kerbside flytippers to most often be young males in full-time employment. They did not find any differences in the demographic characteristics of people who flytip waste at the kerbside.

Household characteristics might however be relevant where they interact with local environmental and/or local waste service conditions, especially because people are likely to be influenced to some degree by the behaviour of their peers. In line with the 'broken window' theory, Yamamoto & Yoshida (2014) found empirical evidence that experiencing flytipping in your own and neighbouring areas increases people's likelihood to flytip themselves.

6.3 How can the problem be addressed?

Because it is often specific contextual issues that will influence people's flytipping behaviour, addressing flytipping may require context specific strategies. Moreover, it appears unlikely that a single approach even in a specific context will suffice to prevent households and commercial businesses from flytipping. An established recommendation by stakeholders engaged in flytipping prevention is a combination of infrastructure measures, education and awareness raising measures and enforcement measures.

Zero Waste Scotland has a significant track-record of successful community interventions to address litter and flytipping behaviour. A summary of detailed options to engage (with) the local community, including case studies and lessons-learned, is published on Zero Waste Scotland's Litter Knowledge Network⁴⁵.

Due to data limitations, work to date has seldom been able to measure – or discount – any displacement effects from localised solutions (the likelihood of this is likely to be dependent on the origin of the waste and offenders). Better geographical mapping tools, such as Flymapper, offer the potential to address this limitation in future studies.

Empirical literature and overseas examples of alternative approaches to tackling flytipping are extremely scarce and don't add much new insight. In the following sub-section, our understanding about changes that are required to improve our knowledge of effective flytipping countermeasures above and beyond those already widely communicated are summarised.

Data capture

The Webb et al. (2006) flytipping review concluded that a "[...] systematic local evaluation of the effectiveness of the measures put in place was very rare." This conclusion still holds for a large number of interventions and flytipping prevention case studies since the report was published. In particular, there is a lack of evidence whether prevention measures at a particular spot are effective in the longer term as 'success' of the intervention is often established in monitoring flytipping arising for a short period after the intervention only.

A second shortcoming of success evaluation that is prevalent in most case studies is the establishment of whether *prevention* of flytipping has actually taken place, or whether offenders have simply moved to alternative locations to flytip their waste. ZWS intends to undertake activities later in 2017 that would develop our understanding of displacement effects of intervention measures. Being

⁴⁵ <http://www.zerowastescotland.org.uk/litter-flytipping/knowledge-network>

able to establish such a findings requires very detailed and near complete reporting of all flytipping incidents in a particular area which is challenging to ensure.

An extension of the app for the use by the general public to report incidents of flytipping could improve long-term data capture of potentially higher granularity. Utilising technology to involve the public in flytipping reporting might, generally, be a cost-effective means to gain improved flytipping data. The ZWS flytipping survey found that a smartphone app to report flytipping would have reasonable appeal, with 51% of respondents stating they would be 'extremely' or 'fairly' likely to report flytipping if they had an app to do so. However, it is not clear whether people would actually do so, and reporting from the public would be expected to be patchy – rarely visited areas might not benefit at all from public reporting, while highly frequented areas may see the same incidents reported multiple times. Certain neighbourhoods may have a more “activist” population when it comes to reporting, and reporting may be more likely in areas where flytipping is less frequent, and thus more noteworthy. At this stage, ZWS believe that public reporting is a crucial management tool, and may offer monitoring potential for the future, but should not, yet, be part of how formal estimates of flytipping levels are calculated. This subject could be further researched as, in fact, publically available apps exist for this purpose, such as the 'Love Clean Streets' app, which might provide some early insight.

The ZWS flytipping survey also found that receiving feedback from the council on the clearance of reported items leads to particularly high satisfaction levels of people with the council's flytipping reporting process. This might encourage the public to take action again in the future and improve reported flytipping rates.

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 prosecute. Flytipping maps can be matched to intelligence data held by SEPA or the police to track and catch persistent offenders.

Improved data capture can be also help to gain insights into whether gate fees for white van carriers are a cost-effective method. For instance, should it be found that gate fees are linked to high flytipping rates in the local authority area, than it might not be cost-effective to charge the given rates or affected businesses. Likewise, improved data capture could also provide better insight into the effect of extending opening hours at gates, and similar infrastructural changes, to counteract flytipping. In a similar vein, councils charging individuals for its bulky uplift service might not be cost-effective if it encouraged flytipping behaviour. While there is currently no robust evidence that this is actually the case, improved data capture of flytipping incidents might, again, allow testing for the cost-effectiveness of different service offers.

Infrastructure

The role of infrastructure in deterring flytipping is highly relevant and traditionally includes the use of physical barriers such as gates, fences, boulders and bunds to restrict vehicular access to known flytipping sites, as well as CCTV to monitor them. Infrastructure measures might also be related to the improved provision of local waste services, such as longer opening hours, free access to small commercial businesses, etc. However, as highlighted above, to test cost-effective changes in this respect requires better data.

Additional technology-based solutions to prevent flytipping are discussed in some of the literature reviewed. Among those are intelligent data extraction systems that enable image, data and document analysis in order to support law enforcement investigations and to be able to quickly identify environmentally critical flytipping locations⁴⁶. Another technological development comprises the use of

⁴⁶ Persechino et al. (2013)

GIS to categorise zones of illegal dumping potential to enable more efficient surveillance⁴⁷. There is little convincing evidence one way or the other on the extent to which measures of this type displace rather than solve flytipping problems – though for the immediately affected communities they can prove highly effective.

Education and awareness

As the ZWS flytipping survey has highlighted, the public may not always understand what exactly constitutes flytipping and, thus, that they might be committing a crime, e.g. when placing a bin bag next to a bin. Likewise, knowing that certain acts constitute flytipping might increase the amount of flytipping reported. The survey also suggests that the public might benefit from improved information on how flytipping can be reported. Reporting to the local council is the most popular reporting channel suggested by respondents⁴⁸. Among the reasons why people wouldn't report flytipping, the key barrier given by people is that they would not know how to (37%). But there is also a fair share of people who prefer to let others deal with it.

Awareness-raising measures might also include the enhanced promotion of services like *Dump Dumpers* and *Crime Stoppers* inviting citizens to partake in the enforcement of flytipping legislation. Being involved in catching offenders might provide a sense of empowerment that might lead to more active engagement.

Communication campaigns could also address people's and small businesses' low level of awareness that using an intermediary to dispose of their waste does not remove their responsibility in ensuring that the waste is legally disposed of. A better understanding of their responsibility to check that they are using a licenced waste carrier, and how to do so, might reduce the extent to which flytipping takes place, although there is no empirical evidence of this. Communication of penalties related to flytipping and enforcement activity is likely to be important in generating a deterrent effect for small scale incidents as well⁴⁹.

Self-imposed 'costs' such as guilt reduce the inclination of people to commit crimes. Communication of guilt inflicting messages about flytipping might therefore also be considered, though again, there is currently no robust evidence of its effectiveness.

A recent qualitative research report on kerbside flytipping by the NSW EPA (2017) recommends a number of kerbside specific awareness raising activities. The research found that the social acceptability of kerbside disposal is reinforced when items are taken away without notification that this is unacceptable behaviour. The report recommends to not immediately remove the dumped items, but to ensure that the incident is clearly (visibly) marked as illegal and the issue under investigation, e.g. using tape and signage. This is to ensure residents are aware of the illegality, but also of the enforcement activities under way. This may increase the perceived likelihood of being fined for flytipping, but may also encourage future reporting.

A general issue around raising awareness among opportunistic offenders is though that the generation of waste that might be convenient to flytip is probably infrequent for most, with the exception of black household bin bags, perhaps. Thus, information opportunistic offenders in a salient time and place may be harder than for habitual offenders.

⁴⁷ Tasaki et al. (2007), Chu et al. (2013)

⁴⁸ Only 2 people mentioned the nationwide "Dumb dumpers" campaign and no respondent referred to the national helpline.

⁴⁹ Larger scale organised criminal operations seem unlikely to be deterred in this way as it is highly likely they are already well aware of what they are doing, and the potential consequences.

6.4 Why do ‘organised’ offenders flytip⁵⁰?

For third parties who collect waste on behalf of householders and small businesses but may not have a waste carriers’ licence – including those often referred to by anti-flytipping practitioners as “white van” businesses – the economic gain of illegally dumping this waste in order to avoid the payment of landfill tax and gate fees is potentially very high. This is especially the case in a competitive market where margins and wages tend to be small⁵¹. This temptation is enhanced by the nature of the crime where the likelihood of being caught is comparatively low.

Webb et al. (2006) highlight that while historic changes in the economic context of waste disposal regulation with relation to the introduction of landfill tax and the EU tyre disposal directive are often quoted as a powerful driver for the illegal dumping of waste, there is very little evidence to substantiate this claim⁵².

In more general terms, however, attractive profit margins for illegal operations resulting from increasingly poor economics of waste treatment due to new (environmentally friendly) regulation have been found to be a significant contributing factor by a number of empirical studies, e.g. Van Erp & Huisman (2010), Dorn et al. (2007), Almer and Goeschl (2010b), Sigman (1998) and Matsumoto & Takeuchi (2011)

St John (2013) conducted an online survey of white van carriers. They found that the main drivers for flytipping by this actor group are

- Perception of peer behaviour,
- Economic pressures,
- Difficulties individuals face with paperwork related to the description of the waste,
- Lack of clarity at waste sites,
- Lack of sense of moral obligation to comply with rules.

St John (2013) also found that the threat of punishment if caught flytipping was less important as a motivator to dispose of waste legally than an established sense of moral obligation to comply with the rules.

A study by the Environment Agency (2012) on illegal tyre waste crime found comparable motivators:

- Financial gain,
- Convenience,
- Opportunism
- Market dynamics/demand,
- Low risk/punishment of offences.

The below lists additional factors that have been identified in the literature:

- Complexity of collection and the downstream infrastructure⁵³,
- Physical characteristics of waste⁵⁴,

⁵⁰ Truly organised offenders are likely to be larger commercial operators with criminal intent who flytip systematically as an integral part of the business model. “White van” carriers may act individually, and potentially simply opportunistically. So the term organised might be less accurate to characterise this offender group. However, the motivation of a repeatedly offending “white van” offender is likely to be in line with more organised offenders and they are therefore included in this section on what causes ‘organised’ offenders flytipping behaviour.

⁵¹ Webb et al. (2006)

⁵² See also example Massari & Monzini (2004)

⁵³ Baird et al. (2014)

⁵⁴ Ibid.

- Distance to nearest waste treatment facilities⁵⁵,
- Low concern for the environmental impacts of flytipping⁵⁶.

6.5 How can the problem be addressed?

For this offender group in particular, education and awareness raising might not sufficiently address the problem on its own. The NSW EPA (2015) found that offenders who were aware of legal disposal methods were no less likely to dump waste illegally. In fact, they found that those who were most aware of, and most likely to have used, the services available were also most likely to have dumped waste illegally.

Webb et al. (2006) and Jill Dando Institute of Crime Science (2006) both state that “Potential methods of preventing flytipping fall into several categories: increasing difficulty, increasing risk, reducing reward, reducing provocation and removing excuses for offenders [...]”⁵⁷. Detailed measures around these categories include:

- Targeting hot-spots,
- Individual registration of vehicles as waste-carriers,
- Charging offenders with ‘tax evasion’,
- Introducing a reward scheme to encourage flytipping reporting by the public,
- Direct billing of flytippers for the cost of clean-up and disposal.

ZWS’s litter report also highlights that enforcement measures are particularly vital to address flytipping resulting from highly organised offenders as other measures are likely to be ineffective (ZWS, 2013).

However, overall it is important to point out that to this date there is very little evidence of what works best under which circumstances.

Enforcement

St John (2013)’s online survey of registered waste carriers found that the probability of receiving a penalty was only weakly related to their flytipping behaviour. Based on a small number of interviews with local authority officials, Davoudi and Brooks (2012) suggest that effective enforcement is hampered because of the limited reporting of the offence which is sometimes due to fear of reprisals for complainants, particularly in deprived areas. The ZWS flytipping survey also found that of those respondents that had seen a flytipping incident, only 12% chose to report it which equates to 3% of the population overall. Potential actions around this link back to awareness-raising measures and technology development to increase public reporting as highlighted in section 6.3.

In terms of public acceptance of an increase in punishment, the ZWS flytipping survey indicates that the majority of people (58%) support more severe punishments than they think exist at the moment, with only 21% saying the punishment should be lower. 52% of 45-54 year old respondents thought flytippers should be given a £5,000 fine or put in prison. This compares to 20% of 18-24 year olds who think the same.

There is however a wider question around the usefulness of high penalties in a context where the probability of being caught for the offence is fairly low. St John (2013) found that only 51% of the registered waste carriers they surveyed perceived the risk of being caught delivering waste to a site that does not have a required permit or exemption to be high. Environmental crime theory states that criminal sanctions for environmental crimes should be inversely related to the probability of being

⁵⁵ Ichinose & Yamamoto (2011), Lucendo-Monedero et al. (2015)

⁵⁶ NSW EPA (2015)

⁵⁷ UCL Jill Dando Institute of Crime Science (2006) offers a good practice guide to local authorities on preventing flytipping.

caught (Cohen, 1992). Analysing the deterrence effect of environmental crime legislation and enforcement, Almer and Goeschl (2010b) find evidence of deterrence where the rate of tried offenders or the rate of prison sentences being imposed is high. They do not find significant effects, however, for the rate of severe fines or conviction rates. At the same time, Lynch et al. (2016) find that where conviction rates are low, the deterrent effect of a high penalty is doubtful. Low conviction rates might also explain why NSW EPA (2015) research found that even a higher perceived likelihood of being caught is not necessarily in itself a strong deterrent to flytipping.

Alternative non-monetary enforcement measures have been tried overseas. NSW EPA (2015) research suggests that 'naming and shaming' businesses guilty of flytipping might be more effective than other potential consequences due to the damage to the businesses reputation. Israel provides a different example. Since 2006, Israel has enacted a policy of vehicle impoundment for the illegal dumping of construction and demolition (C&D) waste according to which truck drivers caught while dumping C&D waste illegally have their vehicles impounded. Empirical research by Seror et al (2014) found evidence of a deterring effect on truck drivers in districts which stringently enacted the policy (Haifa) as compared to those that did not (Jerusalem and Southern district).

Infrastructure

Infrastructural measures could include the simplification of the administrative burden to waste carriers. This would address the finding by St John (2013) on the behaviour of white van carriers that higher compliance might be achieved if the paperwork of the waste reporting system was simplified and better communicated. Moving towards electronic waste transfer notes might be a crucial step in this direction.

7 Summary

Flytipping means the illegal deposit of waste – from a bin bag of household rubbish to large quantities of tyres or construction waste. Flytipping is usually a premeditated, wilful act, although there might be occasions where people are not aware that they are committing a flytipping offence.

Flytipping is a serious blight – especially near landscape and tourist attractions – that impacts the appeal of an area. Flytipping imposes direct financial cost the public and private landowners which are related to the clearance, investigation and prosecution of flytipping incidents, as well as to prevention measures. Flytipping can also have less tangible, indirect consequences such as a negative effect on property values, increased crime rates or increased mental health issues in areas where flytipping is prevalent. Where the composition of flytipped waste includes hazardous waste, flytipping can threaten our ecosystem and wildlife and may even depict a risk to human life.

ZWS's litter report (2013) estimates that at least 26,756 tonnes of waste is illegally flytipped each year and dealt with by local authorities, with an estimated 61,227 incidents occurring. Recent data from national reporting systems indicate a slight decline from these estimates. However, changes to reporting systems in recent years and a related variation in local authorities reporting consistently suggests that the observed incident reduction is likely to not to be an actual trend, but merely a consequence of reporting practices. Improved data capture is vital to quantify the flytipping problem in Scotland with a higher level of confidence.

In Scotland, flytipping is estimated to incur direct costs of at least £11m of taxpayers' money for clearance, disposal and enforcement activities. There are also significant indirect costs. People value a flytip-free environment, but this value is difficult to quantify with certainty.

Flytipping occurs in many rural and urban locations. Waste originating from households, including black bin bags, but also furniture, mattresses and white goods, is the most frequently observed flytipped waste. However, most of the flytipping by weight (potentially 90% or more) is deposited in association with larger scale incidents, which suggests that offenders are not merely individual householders, but often organised.

The vast majority of the public perceives flytipping as unacceptable and feel particularly outraged where the act appears premeditated, such as dumping waste in the countryside. However, parts of public seem to feel more accepting towards acts of flytipping in particular contexts. These include where the public is charged for what they may perceive should be a free service, such as waste disposal at recycling centres by small businesses, or bulky uplifts, or where people lack the space to store and the means to dispose of larger waste items conveniently. There is also evidence that some waste crimes, such as leaving a black bin bag near a bin store, are not perceived as flytipping by a majority of people, but rather littering, or not even an offense at all.

Flytipping is a context-specific problem with incidents characterised by a range of waste types, incident sizes and location profiles. Behind these different types of incidents can be quite differing motivations of the offending individuals. Economics savings (or gains), for instance from the avoidance of disposal fees or uplift costs, are strong motivators underlying most flytipping behaviour. But it is usually a set of additional physical and subjective conditions that increase a person's willingness to commit a flytipping offense.

Householders and opportunistic small business flytipping have been found to be often motivated by specific conditions in relation to:

- Local waste services (e.g. convenience, charges),

- Local environment characteristics (e.g. levels of urbanisation, economic deprivation),
- Attitude and knowledge (e.g. level of guilt; duty of care obligation),
- Household characteristics (to a limited degree).

'Organised' offenders are usually motivated by conditions in relation to:

- Economic pressures and market dynamics
- Convenience
- Perception of peer behaviour
- Perception of risk of punishment
- Attitude and knowledge

Successful flytipping countermeasures usually apply a combination of approaches including infrastructure measures, education and awareness raising measures and enforcement measures. Guidance around these is already well established and in the public domain, such as ZWS's *Community Litter Prevention Guide* which includes advice on flytipping countermeasures.

Empirical literature and overseas examples of alternative approaches to tackling flytipping are extremely scarce and don't add much new insight. Options to advance countermeasures largely are related to improved data capture, such as via the use of advanced GIS-software, supporting reporting and enforcement measures. The low probability of being caught appears to be a main barrier to changing the behaviour of those with low levels of guilt towards flytipping and to whom economic margins and perceived inconvenience are strong behavioural drivers.

Flytipping behaviour and its motivation are reasonably well-understood. Recent research by ZWS has also improved our understanding of the public's perception of flytipping. This research supports the identification of a small number of avenues that may be pursued to advance flytipping prevention measures. Among those are measures related to improved information around the duty of care obligation of private householders and commercial businesses. It also suggests that information campaigns on what exactly constitutes flytipping, especially with regards to local waste services, where the act of flytipping might not be intentional (e.g. placing a black bin bag near a bin store), and why this matters.

The report also highlights that better data is central to fully understand the dimension of the problem in Scotland and to effectively tackle flytipping. By mapping where incidents occur, they become easier to clear up, to prevent in future, and to prosecute. Improved data capture would also help to gain insights into various research questions that are yet unanswerable based on the data available. These include questions about the exact role that different aspects of the waste service provision infrastructure (such as number, accessibility, charges etc.) have on flytipping behaviour, and would allow for an analysis of cost-effective changes to these. Better data would also be crucial to better understand displacement effects of successful flytipping interventions. Advances in technology, such as app developments for the public to feed into flytipping reporting might further enable improved understanding of the problem in Scotland and effective countermeasures.

Evidence on drivers for flytipping and effective countermeasures is an area of growing concern in Scotland and elsewhere, as the consequences and costs of waste crime become better understood, and as new technology enables better monitoring of both the problem, and the effectiveness of different interventions. This report is a starting point for improving our understanding of what works, but we look forward to future developments in this area.

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