Commercial Waste Zoning:
Feasibility Research

Zero Waste Scotland

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resourcefutures

Document prepared for

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Limitations

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Executive Summary

Introduction

The Scottish Government has made a commitment to develop a Route Map to reduce waste and ensure national waste and recycling targets are met. *Delivering Scotland's Circular Economy: A Route Map to 2025 and beyond* [1] was open for public consultation between May and August 2022. It sought to gather views on the strategic approach that could be taken to both accelerate and ensure that the 2025 emissions reductions are achieved. Package four of the consultation, *Improve Recycling From Commercial Businesses*, aims to support businesses to reduce waste and increase recycling. New measures proposed to achieve this goal include conducting research to examine Commercial Waste Zoning approaches (referred to as zoning in this report).

Commercial Waste Zones (CWZs) provide commercial waste management for businesses in the designated zone, usually through legislative means or on a voluntary basis. The aim of CWZs is normally to improve one or more of the following:

- the efficiency of commercial waste collections;
- the quality and quantity of materials collected for recycling;
- air quality;
- reducing carbon and other greenhouse gas (GHG) emissions; or
- reducing the number of collection vehicles on the roads.

Broadly, there are two main types of CWZs, mandatory and voluntary, which are defined as follows:

- **Mandatory CWZ:** A mandatory (or non-voluntary) model of zoning, allowing local authorities to award contracts to one or more waste operators, giving them exclusive rights to operate in each area. The businesses in the zones are not permitted to use a contractor other than operators contracted for that zone; and
- **Voluntary CWZ**: Under a voluntary model of zoning, waste collection operator(s) are granted a non-exclusive right to operate in each area (i.e., other operators will continue to provide waste services). For example, Business Improvement Districts will select waste operator(s) which are promoted as the preferred waste supplier for the BID area.

Aims

The aim of the research was to gather empirical data, knowledge and understanding of the potential feasibility of zoning in Scotland. This report will inform and support decision making on zoning in Scotland and the potential design of future trials if considered appropriate.

The specific aims were to:

1. Improve understanding of existing direct and indirect benefits, issues and costs, where available, in relation to recycling rates, air quality, GHG emissions, and noise levels;
2. Assess the strengths, weaknesses, opportunities and threats of zoning for key stakeholders; and

[1] Scottish Government (2022). Delivering Scotland's circular economy: A Route Map to 2025 and beyond.

3. Consider the potential applicability of zoning in Scotland including the regulatory requirements and its suitability in an urban and rural context.

Methodology

Desk-based research and interviews were used to inform each of the tasks as follows:

1. **Evidence and literature review** to identify and assess cases and available data. This identified 10 mandatory and 10 voluntary zoning schemes. Four mandatory zoning schemes were assessed in New York City,[2] Barcelona, Los Angeles and San Jose, and four voluntary zoning schemes operated by BIDs in West End London, Putney, Norwich and Bath were explored in further detail. These examples were representative of different types of CWZs;
2. **Interviews with organisations involved in zoning** to explore the reasons schemes were established, the impact they'd achieved and any lessons learnt. Interviews were conducted with organisations involved in implementing CWZs (such as BID managers or local government officials). Waste management companies (WMCs) and businesses from the UK and international cases were also interviewed;
3. **A regulatory review** of the cases researched and how the current legislative framework in Scotland would or wouldn't support zoning. This was primarily conducted through desk-based research, but supplemented with findings from the interviews and the stakeholder workshops; and
4. **A stakeholder workshop** to gather views from Scottish stakeholders on implementing zoning in Scotland, including any perceived benefits and risks. Representatives from WMCs that operate nationally, regionally and locally, urban and rural local authorities, universities, businesses, BIDs and public interest groups were invited to attend the workshop.

See section 2 of the report for full details on the methodology.

Research findings

A significant finding of the research was a general lack of empirical data on the impacts of CWZs. Whilst there was some quantitative data on recycling rates, this was only for a few of the case studies. Section 3.1 presents findings from desk-based research and interviews on the impact of mandatory and voluntary CWZs on a range of factors, including recycling rates, air quality and GHG emissions. Due to the lack of established baselines and empirical data, it is not possible to quantify the impacts of the zones in most cases. A summary of the key impacts associated with zoning can be seen in Table E1.

Table E1: Summary of impacts of mandatory and voluntary zoning on environmental and service related factors.

[2] Although New York City has not yet implemented zoning, the planning and development process was explored in further detail.

Factor	Mandatory	Voluntary
- Recycling Rates	- As part of zoning implementation, the cases studied mandated separate collections by businesses which increased recycling rates. In one case, waste that was recycled and composted rose from 22% to 71%.[3] Recycling was more cost-effective for the business, but awareness and communications meant some businesses experienced poor service initially.	- Increased recycling was seen in voluntary CWZs. In one case, recycling rates increased from 47% to 72%.[4] Some of the voluntary schemes supported businesses by offering advice and guidance on recycling to help improve rates. Preferential rates were also often given to help increase recycling.
- GHG Emissions	- Cleaner vehicles, powered by compressed natural gas, were introduced as part of the zoning requirement in the USA cases, reducing GHG emissions and improving air quality. However, in some of the cases there is no evidence the number of vehicles reduced as the service was expanded to collect additional materials.	- Creative innovation and service development observed i.e. collection by e-cargo bikes and collection consolidation points to mitigate collection time restrictions and congestion, reduce GHG emissions and improve air quality. This could also be applicable to mandatory CWZs.
- Data	- Data recording and quality on commercial waste improved.	- Data recording and quality on commercial waste improved.
- Service quality	- In one of the cases an initial reduction in service quality was seen due to challenges in the roll-out. This could be mitigated with appropriate planning. - Contracts in mandatory schemes were longer (10 years), which was seen as necessary to make it commercially viable for WMC to invest in cleaner equipment. However, this removed incentive to improve service quality.	- Co-created contracts with the WMC and the BID management group improved service quality by enabling bespoke flexible service provision and competitive costs. - Contracts were typically shorter (five years or less), to incentivise WMCs to improve service provision so they could win future procurement rounds.

[3] Romanow (2017). Status report on zero waste strategic plan 2022. San Jose's Department for Environmental Services

[4] ReLondon (undated) Case Study – Putney Pedals ramps up recycling on busiest high street in London

Factor	Mandatory	Voluntary
- Collection costs for businesses	- The cases examined reported varied impacts on collection costs for businesses. In one scenario, an additional charge arose for non-kerbside collections. The cost of residual waste also increased to incentivise recycling, however, not all businesses understood this and remained on predominantly residual collections initially.	- In some examples group purchasing power of the BIDs secured a reduced rate for businesses. In a voluntary model there needs to be a cost incentive to drive businesses to switch WMCs. This also benefits WMCs as they have increased business and support from BIDs to promote their services.

Section 3.2 presents a **Strengths, Weaknesses, Opportunity and Threats** (SWOT) analysis of introducing zoning for various key stakeholders. This is dependent on the design of the scheme, so some of the SWOT may not be applicable across all types of schemes.

- For **waste management companies** the main perceived threat was not securing a contract and losing business. This has the potential to be a greater threat in the mandatory schemes. However, zoning can provide WMCs with guaranteed revenue in the mandatory schemes if they are awarded a contract.
- For **businesses** a strength of the voluntary examples was that zoning facilitated a co-created service delivery based on the requirements of the BID area which improved service delivery. Voluntary CWZs offer a potential opportunity associated with being price competitive. There was a significant threat of service disruption through roll-out of mandatory schemes if poorly designed and/or communicated.
- For the **public** both mandatory and voluntary zoning could provide an opportunity of improved street scene in regard to reduced congestion and associated impacts if vehicle numbers are reduced and/or cleaner vehicles used.
- For **local authorities,** both mandatory and voluntary examples enabled the implementation of services where zoning has already been implemented (for example, mandatory separate collections, cleaner vehicles or data reporting). This helped achieve recycling and wider environmental ambitions.

The **regulatory review** detailed in Section 3.3 confirmed that Scotland already has in place many pieces of legislation that would enable it to achieve the positive impacts that were seen in the examples of zoning. For example, Scotland and/or local authorities already have powers to introduce separate collections, waste targets, air quality and bin presentation. As noted in the Circular Economy Bill consultation, there is not existing legislation that would enable the setting up of a mandatory CWZ.[5] However, there is already legislation in place which enables the introduction

[5] Scottish Government (2022) *Delivering Scotland's circular economy – proposed Circular Economy Bill: consultation*

of voluntary CWZs, which are more commonly referred to as preferred waste collection supplier schemes.

Conclusions on the applicability in Scotland

Section 4 of the report aims to put the learnings from these cases into the Scottish context and explore possible impacts of zoning in Scotland. There were almost no established baselines in the locations where zoning has been implemented, which therefore presents challenges in understanding the scale of the impacts and how they could be applied in Scotland.

Commercial waste zoning has the potential to improve recycling performance in Scotland. However, Scotland is at a different starting point than the mandatory cases that were examined, in that Scotland already has mandated separate collections. Therefore, there is some uncertainty whether the introduction of mandatory zoning in Scotland would have the same increase in recycling performance as seen in the international examples. However, both mandatory and voluntary approaches have the potential to have a positive impact on recycling performance, GHG emissions and air quality. The mandatory schemes may provide a greater opportunity for route efficiency and a bigger switch to cleaner low/zero emission vehicles, however, the impact of this cannot be quantified.

The examples that were examined in this research did highlight that there are potential risks associated with implementing a mandatory approach, including increased costs and poor customer service. However, this could be mitigated through appropriate planning and communication. Lessons could be learned from the voluntary examples, which provided greater support and communications to businesses. There is no reason why learnings such as this could not be integrated into a mandatory scheme. Improved data quality is one area where a mandatory approach could have a bigger impact than voluntary as it will offer greater consistency.

The planning time required to design and implement zoning, whether voluntary or mandatory should not be underestimated. These are critical stages and adequate time must be allowed to conduct the research and model the potential impact that zoning can have. Time spent at this stage will help to mitigate some of the weaknesses and threats that have been identified.

One of the key points of concern identified relates to waste management companies and the consequence introducing a mandated CWZ would have on the suppliers. During the workshop, attendees were invited to express their views on the impact of implementing zoning. Some actions identified that could be used to address concerns include: design the procurement process to ensure that SME WMCs are still competitive; consider efficiency in zoning design; structure the zones to encourage service development; innovation and investment; and limit the number of zones one WMC can operate in.

All the cases reviewed during this research were from an urban setting. A review of the number of waste contractors operating in each local authority area was also carried out. When comparing the number of WMCs operating in urban areas with rural areas, it was observed that the average

number of rural based waste contractors is significantly smaller. In these areas, air quality and noise pollution are likely to be better than other areas due to lower population numbers and lower levels of traffic. As a result the potential benefits of zoning may not be of the scale when considering a large urban area. This is not to say, however, that zoning in rural areas is not worth exploring. Climate change is a global issue and all reductions in GHG emissions contribute towards the overall action toward achieving reduction targets. Due to the low number of WMCs servicing a large geographical area, further research would be needed to assess issues being experienced by rural businesses in relation to their waste collections.

Next steps

A key reason why Scottish Government is interested in CWZs centres around the impact they could facilitate on improving recycling rates and reducing associated GHG emissions. Findings suggested that zoning has the potential to impact these factors, however, the scale of this cannot be translated directly from international case studies as the context that drove the implementation of CWZs is different to Scotland. Whilst the findings show that voluntary examples could potentially have a positive impact on recycling performance and GHG emissions, these are taken from UK-based examples that are at a similar starting point to Scotland. Therefore, additional research and modelling needs to be undertaken to further understand the scale of the impacts of voluntary and mandatory CWZs. This should also include an assessment as to whether either of these will be more effective than using existing legislative measures such as introducing LEZs or improving enforcement of mandated separate collections.

Recommended next steps includes:

1. Establish a baseline of existing waste management practices.
2. Model different approaches of voluntary and mandatory zoning to quantify the scale of their impact.
3. Pilot an approach dependent on model findings.

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List of abbreviations:

BID	Business Improvement Districts
C&D	Construction and Demolition
CNG	Compressed Natural Gas
CO_2eq	CO_2 Equivalent
CWZ	Commercial Waste Zone(s)
DSNY	New York City Sanitation Department
EPA	Environmental Protection Act 1990
ESG	Environmental, Social and Governance
eRCV	Electric Recycling Collection Vehicle
ETRO	Experimental Traffic Regulation Order
FPN	Fixed Penalty Notice
GHG	Greenhouse Gases
HGV	Heavy Goods Vehicle also known as Large Goods Vehicle (LGV)
LASAN	Los Angeles Department for Sanitation & Environment
RCV	Recycling Collection Vehicle
RFP	Request for Proposals
SME	Small and Medium Enterprise
SWOT	Strength, Weaknesses, Opportunities, Threats
TRO	Traffic Regulations Order
WMC	Waste Management Contractor

Glossary

Business Improvement District (BID): A business-led organisation in a specific geographical location where businesses vote to invest together to improve their local environment.[6] The approach to waste management is voluntary.

Commercial Waste Zones (CWZ) and zoning: A geographic area that is designated to allow for collection of waste from commercial businesses. Waste contractors will enter into contractual agreements to collect waste from these zones. These can either be mandatory or voluntary (see definition below).

In all examples the waste/recycling concerned did not include construction and demolition, hazardous waste, clinical waste or confidential paper shredding.

CO_2eq: The standard metric measure to compare the global warming potential of various Greenhouse Gases.[7]

Diversion: Used in the mandatory Californian examples to mean the combined efforts of waste prevention, reuse and recycling practices.

Electric Recycling Collection Vehicles (eRCV): Any electric four wheeled vehicle involved in the collection and transportation of commercial recycling and waste. This is a term used for the smallest 3.5 T caged vans all the way up to 26 T vehicles.

Mandatory Commercial Waste Zone: A mandatory (or non-voluntary) model of commercial zoning which allows local authorities to award contracts to a waste operator, giving them exclusive rights to operate in a given area.

Recycling Collection Vehicles (RCV): Any non-electric four wheeled vehicle involved in the collection and transportation of commercial recycling and waste. This is a term used for the smallest 3.5 T caged vans all the way up to 26 T vehicles.

Voluntary Commercial Waste Zone: Under a voluntary model of commercial waste zoning, waste operator(s) will be granted a non-exclusive right to operate in each area. In the UK, BIDs will typically select operator(s) as the preferred supplier for the BID area.

[6] Greater London Authority (Undated). About Business Improvement Districts
[7] Climate Policy Info Hub

1 Introduction

1.1 Research policy background

In 2018, greenhouse gas (GHG) emissions from the waste and resource sector were 70% lower than in 1998.[8] However, significant action is still required to reduce GHG emissions from 1.9 to 1.2 megatonnes CO_2 equivalent (CO_2eq) by 2025 and 0.8 megatonnes CO_2eq by 2030 as set out in the Climate Change Plan (2018-32).[9] The Scottish Government has made a commitment to develop a Route Map to reduce waste and ensure national waste and recycling targets are met as part of the Programme for Government 2020-2021[10] and Scotland's Climate Change Plan Update.

Research on international and UK examples of commercial waste zoning (referred to as zoning in this report), conducted in 2021 by Resource Futures for Zero Waste Scotland, identified that zoning implementation could potentially offer environmental benefits in urban areas of Scotland. Further research, however, is needed to understand implications in a Scottish context and around key issues, such as, operating restrictions in zoning areas, mandatory versus voluntary participation, geographical considerations and the wider costs and benefits of implementation.

Delivering Scotland's Circular Economy: A Route Map to 2025 and beyond [11] was open for public consultation between May and August 2022. This sought to gather views on the strategic approach that could be taken to both accelerate and ensure that the 2025 emissions reductions are achieved. Package four of the consultation, *Improve recycling from commercial businesses*, aims to support businesses to reduce waste and increase recycling. New measures proposed to achieve this goal include conducting research to examine zoning approaches. This is needed to evaluate the potential effectiveness of zoning in Scotland, and it may inform any potential trials that go ahead in the future.

A pre-consultation stakeholder workshop to *Delivering Scotland's Circular Economy,* conducted in autumn 2021, raised several concerns regarding the potential impacts of CWZs on competition and innovation, particularly in reference to:

- Fair competition for small and medium enterprises' (SME) waste management companies; and
- How CWZs could affect waste contracts with large national businesses.

1.1.1 Definition of a commercial waste zone

CWZs are created with the purpose of providing commercial waste management for all businesses in the designated zone, usually through legislative means or on a voluntary basis. In the UK, voluntary CWZs have been set up by Business Improvement Districts (BIDs). The Waste Management Contractors (WMC) are normally selected through a competitive bidding process.

[8] Scottish Government (2020). Climate Change Plan 2018-2032-Update
[9] Scottish Government (2020). Climate Change Plan 2018-2032-Update
[10] Scottish Government (2021). Protecting Scotland, Renewing Scotland: The Government's Programme for Scotland 2020-2021
[11] Scottish Government (2022). Delivering Scotland's circular economy: A Route Map to 2025 and beyond.

Waste zoning measures have been implemented in a variety of locations globally with the aim of improving one or more of the following:

- the efficiency of commercial waste collections;
- the quality and quantity of materials collected for recycling;
- air quality;
- reducing carbon and other greenhouse gas emissions; or
- reducing the number of collection vehicles on the roads.

Definitions of key terms used in this report for CWZ models are:

Mandatory CWZ: A mandatory (or non-voluntary) model of zoning, allowing local authorities to award contracts to one or more waste operators, giving them exclusive rights to operate in each area. The businesses in the zones are not permitted to use a contractor other than operators contracted for that zone.

Voluntary CWZ: Under a voluntary model of zoning, waste collection operator(s) are granted a non-exclusive right to operate in each area (i.e., other operators will continue to provide waste services). For example, Business Improvement Districts will select waste operator(s) which are promoted as the preferred waste supplier for the BID area.

1.2 Aims and objectives

The aim of this research was to gather empirical data, knowledge and understanding of the potential feasibility of CWZs in Scotland, building on the research conducted for Zero Waste Scotland by Resource Futures and Winning Moves in 2021.[12] The outputs of this research will play a key role in supporting decision making on zoning in Scotland and the potential design of future trials if considered appropriate.

The specific aims were to:

1. Improve understanding of existing direct and indirect benefits, issues and costs, where available, in relation to air quality, GHG emissions, noise levels and recycling rates of zoning models;
2. Assess the strengths, weaknesses, opportunities and threats of zoning for key stakeholders; and
3. Consider the potential applicability of zoning in Scotland including:
    - Assessment of the regulations required to implement CWZs;
    - Assessment of the applicability in both rural and urban locations with reference to the Scottish Government's Urban Rural Classification 2020.[13]

[12] The report produced by Resource Futures for Zero Waste Scotland summarises how CWZ has been approached in other parts of the UK, Europe, and North America. This report is currently unpublished.

[13] Scottish Government (2022). Scottish Government Urban Rural Classification 2020

2 Research methodology

The research was based around four key tasks focused on gathering data and information to answer the objectives of the study. The four key data gathering tasks are outlined in Figure 1.

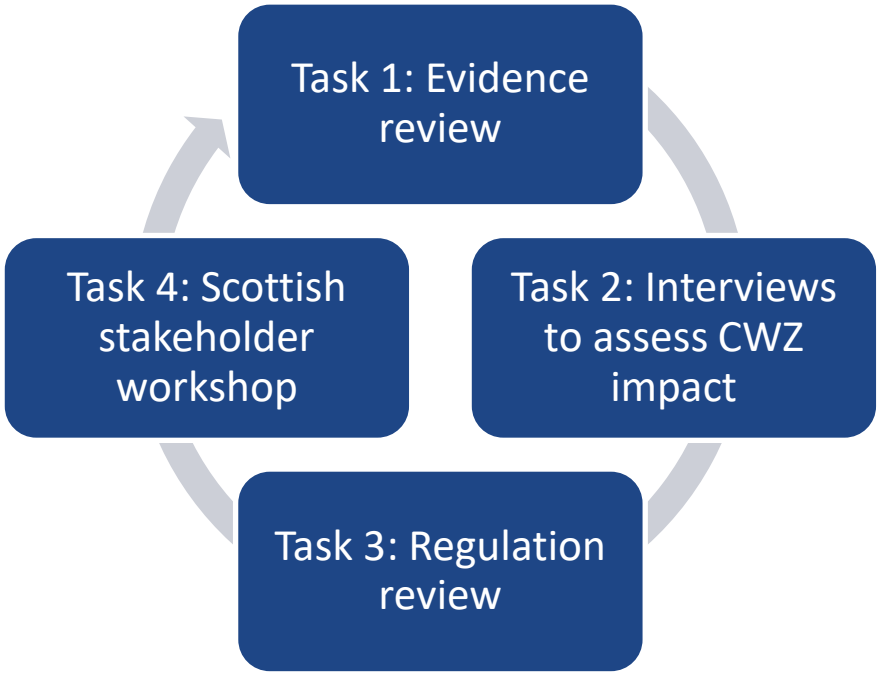

Figure 1 Flow diagram of research method

The research focused on cases of CWZs that had been implemented in the UK and internationally. Each of the tasks focused on cases that provided the greatest insight into zoning and how it could be implemented in Scotland. This was an iterative process and each task provided new learnings that hadn't been seen in the previous tasks. The initial desk-based research quickly identified that the amount of academic and publicly available data on the impacts of zoning schemes was extremely limited. Instead, effort was focused on gathering information from organisations that were involved in the design and implementation of CWZs in the respective case studies.

The desk-based research and interviews were used to inform each of the tasks as follows:

1. Desk based research to identify cases and available data:
    a. Informed the list of cases and quality of publicly available research and data;
    b. Informed the selection of cases for inclusion in the initial "rapid SWOT"; and
    c. Informed interview selection and stakeholder mapping.
2. Interviews:
    a. With case selection informed by a desktop review and an initial "rapid SWOT".
3. Regulatory review:
    a. With information gathered through desk-based review and interviews.
4. Workshop.

2.1 Task 1: Evidence review

A desk-based literature review was conducted to create an initial list of examples, including international and UK towns and cities, that have implemented CWZs. The cases were identified by searching for 'commercial waste zoning' and other similar terms including 'waste consolidation schemes', 'preferred waste supplier schemes', and 'exclusive commercial waste franchise agreements'. BIDs that had a preferred waste supplier scheme were also included in the search. The cases identified in the previous research conducted by Resource Futures for Zero Waste Scotland in 2021 were also included. The cases identified are listed in Appendix 1. Information gathered through this initial stage included whether the scheme was mandatory or voluntary, the size, the objectives and the quality of data available.

Once the initial list of example mandatory and voluntary zoning cases was compiled, the next stage was to conduct a review of academic research looking specifically at zoning effect on air quality, GHG emissions, noise levels and recycling rates. A search was conducted using Google, Google Scholar, and Scopus, which showed that academic study on the impacts of commercial waste zones on environmental factors is very limited.

An initial rapid SWOT analysis was conducted across six cases using data available in the public domain. The SWOT considered the impacts of CWZs on businesses, commercial waste contractors, the public, local authorities, the local government and their waste and recycling objectives. These six cases were selected for the initial rapid SWOT analysis based on:

- availability of data / information
- diverse geographic location
- range of implementation approaches
- target area of impact e.g., recycling performance, air quality etc.

Due to the lack of published academic research or empirical data, evidence was taken from numerous sources including previous stakeholder engagement carried out by Resource Futures, news articles, local government and WMC websites, and government reports.

The six example cases assessed through the initial rapid SWOT were:

1. Los Angeles (Mandatory)
2. Barcelona (Mandatory)
3. West End London BID (Voluntary)
4. Norwich BID (Voluntary)
5. Bath BID (Voluntary)
6. Essential Edinburgh BID (Voluntary)

The summary of this initial rapid SWOT analysis can be found in Appendix 2.

2.2 Task 2 - Interviews to assess impacts of CWZs

Task 2 involved conducting structured interviews with organisations involved in planning, procuring and managing of CWZ identified through Task 1. The aim was to gather information and data on the changes or impacts observed and/or reported on following the introduction of CWZs.

The selection of cases investigated in Task 2 was based on the following factors:

- General availability of data and information online including recycling rates, GHG emissions, air quality and noise levels;
- Whether the CWZ had been implemented;
- A mix of mandatory and voluntary cases;
- A range of locations and size of CWZ cases, with examples from the UK and Europe, and cases in smaller cities, included where possible;
- With the voluntary CWZ (BID) cases, there was a preference for examples that were well publicised (Putney, Bankside, Baker Street) or were comparable in the Scottish context (Bath, Norwich, Edinburgh); and
- Whether the waste scheme collects only commercial waste, or they include the collection of household waste. Preference was given to cases focused on commercial waste or where commercial made up more than 50% of the waste output.

Organisations involved in setting up the CWZs (primarily BID managers or local government), WMCs, businesses in the CWZs and public interest groups were contacted for interview. However, it was not possible to secure an interview with public interest groups of businesses in the CWZs of interest. Representatives involved in the mandatory CWZs in Los Angeles and San Jose were interviewed. An interview was also conducted with a representative from the Catalonian waste authority to understand the drivers of the CWZ in Barcelona. Representatives involved in the voluntary CWZs (BIDs) in Norwich, Bath, London, and Edinburgh were also interviewed.

Participants were asked whether a baseline had been taken or if any quantitative data had been collected to measure the impact of the zoning. In particular, the interviews aimed to find empirical data on the following driving factors:

- recycling rates
- service quality and consistency of service
- data quality on commercial recycling
- collection timings and presentation of containers
- cost for waste collection services for businesses
- GHG emissions (particularly CO_2) from transport
- air quality
- noise levels
- recycling rates
- CO_2eq from waste

Where quantitative data was not available or not shared, subjective views and opinions on impacts and observations were explored with the interviewees. A pro-forma (Appendix 3) was developed to provide a structure for the interviews.

2.3 Task 3: Regulatory review

A regulatory review was undertaken for both the mandatory and voluntary CWZs researched in the Task 2. The aim of the regulatory review was to understand which legislative measures were used to implement CWZs and the wider regulatory context required to achieve the desired outcomes in each of the example cases. The regulatory review was primarily conducted through desk-based research and interviews but were also supplemented with findings from the stakeholder workshop outlined in section 2.4.

2.4 Task 4: Stakeholder workshop

A stakeholder workshop was held in Edinburgh to discuss and explore the applicability of zoning in Scotland. A number of stakeholders that would potentially be impacted by the implementation of zoning were considered and approached to take part in the workshop (Appendix 4). These included:

- Waste management companies that operate:
    - nationally;
    - regionally; and
    - locally
- Local authority representatives
- University representatives (from multiple local universities)
- Business representatives (variables: location size of business, type of sector)
- Public representatives
- Business improvement district (BID) representatives
- Zero Waste Scotland representatives

Of the stakeholder groups listed above, representatives of all groups except businesses and public interest groups, attended.

Figure 2 shows the format of the workshop. Workshop facilitators presented research findings from the previous tasks. This was followed by an exercise to stimulate discussion on where biggest impacts could be made and whether these could be achieved through zoning or alternative approaches. The workshop concluded with a discussion on the key challenges of implementing zoning in Scotland and if and how they could be addressed.

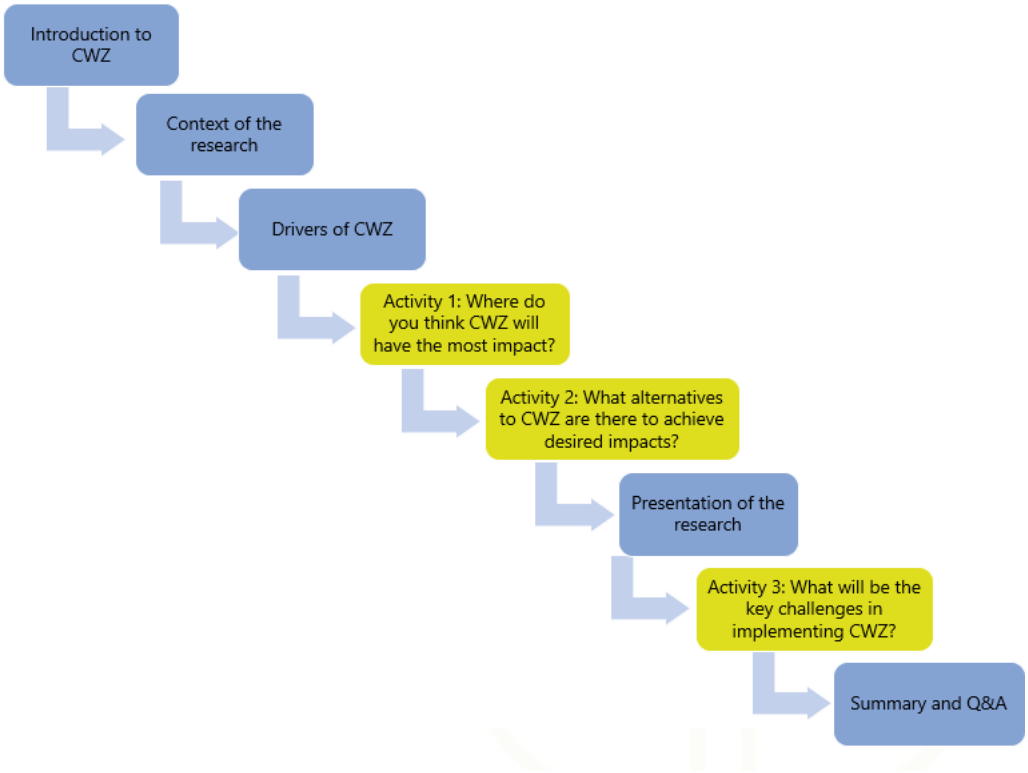

Figure 2. Structure of the workshop

It was intended that two workshops would be held, one in the central belt and one in the North of Scotland. However due to low responses, only one workshop was held. In the place of a workshop, an interview was held with the BID manager in Inverness to provide insight to the issues being posed by current waste management practices locally. The interview gave the opportunity to explore how using a zoning approach could potentially help resolve these issues.

3 Research findings

This section presents the findings from all the research tasks combined. The findings are presented on a topic basis. The research did not source a rich and full set of data in the public domain. Interviews with stakeholders involved in the design and implementation of CWZs provided a valuable source of information, and it should be noted that the vast majority of information presented in this section was gathered from interviews and local government websites.

3.1 Impact

The data on environmental and operational impacts are predominantly from three example cases: Los Angeles, San Jose, and Positive Putney BID. These had the most quantitative data available and the interviewees were willing to share detailed information on the design and implementation of CWZs. Whilst the drivers for implementing CWZs varied across the different cases, they all sought to improve environmental quality and provide a better service for the businesses within the zones. Appendix 5 reproduces the stated aims for Los Angeles and New York City mandatory CWZ. Note: no single CWZ case (voluntary or mandatory) was able to provide empirical data on all the factors explored.

3.1.1 Primary impacts of interest (recycling rates, air quality, GHG emissions and noise levels)

3.1.1.1 Recycling rates

Mandatory schemes

Los Angeles and San Jose legislated that commercial waste must be recycled. A zoning scheme was implemented to achieve that aim. In Los Angeles, WMCs were required to reduce the amount of waste sent to landfill by 65% by 2025[14] from their 2019 baseline. Progress was reviewed in 2022 and will be reviewed again in 2024. If the WMCs do not meet their targets, they may have to pay a fine to the Los Angeles Department for Sanitation and Environment (LASAN) for not meeting their contractual obligations.[15] Progress has been made towards achieving these targets with landfill tonnages for all waste companies decreasing from 2019-2020 (Table 1). However, only one company, Athens, met their contractual target in 2020. At the time of writing this report, waste figures for 2022 were not yet available.

[14] Los Angeles Department for Sanitation & Environment (Undated). RecycLA Progress
[15] Los Angeles Department for Sanitation & Environment (Undated). RecycLA Progress

Table 1: Landfill tonnages and targets for 2019 and 2020 for RecycLA waste management companies[16]

Waste Management Company	2019 Landfill Tonnage		2020 Landfill Tonnage		
	Contractual target	Actual	Contractual target	Actual	
Athens	437,332	**501,610**	417,769	**396,288**	Target Met
CalMet	20,935	**31,029**	18,328	**26,979**	Target Not Met
NASA	58,530	**108,097**	55,983	**78,314**	Target Not Met
Republic	274,598	**367,111**	253,662	**342,610**	Target Not Met
UWS	85,007	**138,625**	75,628	**121,289**	Target Not Met
WARE	24,387	**45,791**	21,895	**38,995**	Target Not Met
WM	282,823	**324,416**	263,912	**299,953**	Target Not Met

Since 2012, San Jose has mandated recycling of commercial waste through the introduction of zoning. This led to an increase in recycling rates from 22% in 2012 to 71% in 2015[17] (Figure 3). At its inception, it was expected that recycling rates would reach 80% by 2014.[18]

The implementation of a wet (organics) and dry (residual waste and recycling) bin system through zoning has increased the amount of waste separated by businesses.[19] However, it is less expensive for businesses to only have a dry bin so the recycling of organic materials has not been as high as anticipated.[20] This is expected to change with the introduction of California state legislation SB 1383 which states that organic waste collection services must be provided to all businesses.[21]

[17] Romanow (2017). Status report on zero waste strategic plan 2022. San Jose's Department for Environmental Services
[18] Romanow (2017). Status report on zero waste strategic plan 2022. San Jose's Department for Environmental Services.
[19] Romanow (2017). Status report on zero waste strategic plan 2022. San Jose's Department for Environmental Services
[20] Interview with an anonymous stakeholder, October 2022
[21] CalRecycle (Undated). New Statewide Mandatory Organic Waste Collection.

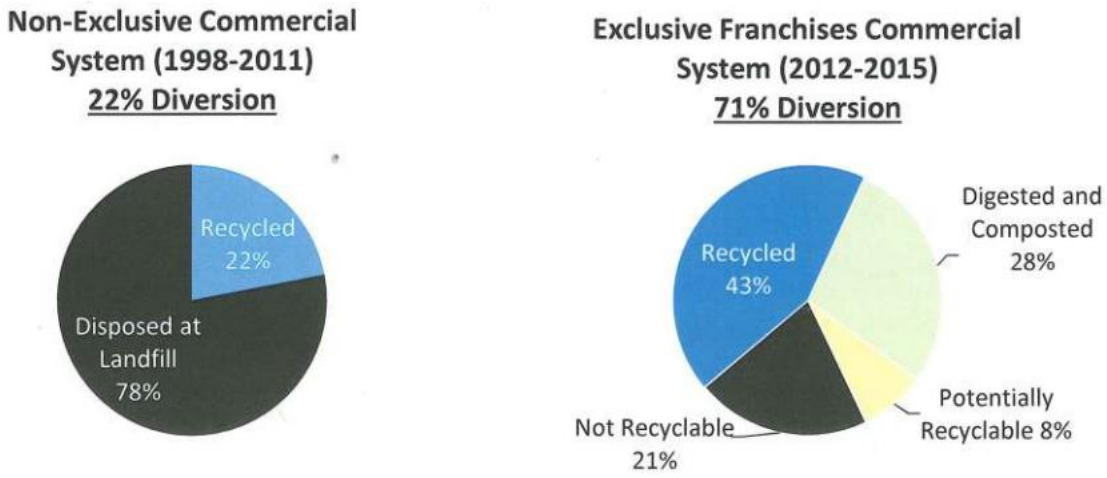

Figure 3: Changes in recycling rates post implementation of the exclusive franchise commercial system[22]

Voluntary schemes

In the first six months, the Putney Pedals scheme increased recycling rates from 47% to 72%.[23] This was a result of the Positive Putney BID providing a subsidy for contracted recycling services and providing better flexibility around Wandsworth Councils' time-bands for commercial waste collections.[24] The operator of the e-cargo bike had a very compact route, enabling the bike to complete up to 30 collections in a maximum of three hours before it emptied the waste and recycling at the consolidation point at the end of the high street. The consolidation point was collected by large RCVs operated by the contracted collection company.[25] This slower approach to collecting from the businesses allowed the waste collector to develop a relationship, give advice on source separation and answer questions on general recycling best practice to the businesses. This was a stand-out aspect that BID members reported that they appreciated about the scheme.[26]

3.1.1.2 Air quality and GHG emissions from transport

Mandatory schemes

Both Los Angeles and San Jose required waste contractors to use compressed natural gas (CNG) vehicles. However, data on changes in air quality or GHG emissions are not available in the public domain. It is assumed that this transition did result in lower GHG emissions and better air quality than prior to the implementation of the zone due to lower Nitrous Oxide (NOx) and Particulate Matter (PM) emissions associated with CNG vehicles. One study from Milan showed that a CNG

[22] Romanow (2017). Status report on zero waste strategic plan 2022. San Jose's Department for Environmental Services
[23] ReLondon (undated) Case Study – Putney Pedals ramps up recycling on busiest high street in London
[24] ReLondon (undated) Case Study – Putney Pedals ramps up recycling on busiest high street in London
[25] Interview with an anonymous stakeholder, October 2022
[26] Interview with an anonymous stakeholder, October 2022

waste collection vehicle on average had 86% lower NOx and 75% less PM emissions than its diesel counterpart.[27] However, the impact on overall air quality in these cities could not be quantified.

The lower emissions of CNG vehicles can allow an increase in the services provided, whilst still providing lower emissions than the diesel trucks according to one interviewee. In the case of Los Angeles CWZs, there are more trucks in operation now than prior to the CWZ being introduced, due to introducing the collection of additional materials.[28] Appendix 6 provides a modelled estimated impact on emissions resulting from the change to CNG collection vehicles.

In a Scottish context, if similar requirements were made to use low-emissions vehicles through zoning, improvements in GHG emissions and air quality could be realised. It is noted that local authorities do currently have the power to address emissions from all types of vehicles that operate in their area. However, they do not have the power to specifically tackle emissions only associated with commercial waste collection vehicles. Zoning could therefore address the specific issue of RCV emissions. It would be required to model the impact of this CWZ targeted approach linked to the number of collection vehicles currently in operation and the cumulative impact.

Voluntary schemes

No empirical data on air quality associated with the voluntary CWZ cases interviewed were found. However, it is noted that there was a reduction of collections by recycling collection vehicles in Putney and a conversion to electric RCVs (eRCVs) in the Edinburgh BID by the preferred waste supplier.

The Putney Pedals CWZ was implemented to reduce congestion and pollution on Putney High Street.[29] It involved the BID using an e-cargo bike to collect recycling, including separate food waste, to be transported to a consolidation point from which waste and recycling was then collected by an RCV.[30] Any impacts on GHG emissions are only associated with the avoided collection on the high street (1.2km) as a normal collection vehicle is still collecting from the consolidation point. If the largest proportion of the distance travelled by an RCV is from depot to collection point and back, then this demonstrates the need to move to lower emission vehicles and/or reduce the number of vehicles to have a positive impact. Appendix 6 provides a modelled estimated impact on emissions resulting from the reduction of RCV collections on Putney High Street.

Westminster Council and the New West End Company (NWEC) found that the air quality improved and there was a reduction in congestion.[31] Improvements in air quality and congestion, however, could be attributed to other factors rather than being a direct result of the CWZ scheme. Waste vehicle movements decreased by 94% from 144 to nine per day. There was also a 76% reduction in

[27] Fontaras, Georgios et al. (2012). "Assessment of on-road emissions of four Euro V diesel and CNG waste collection trucks for supporting air-quality improvement initiatives in the city of Milan." *The Science of the total environment* vol. 426 (2012): 65-72
[28] Interview with an anonymous stakeholder, October 2022
[29] Interview with an anonymous stakeholder, October 2022
[30] ReLondon (Undated). Case study-Putney Pedals ramps up recycling on busiest high street in London
[31] Interview with an anonymous stakeholder, October 2022

CO_2, 76% reduction in NOx and 74% reduction in PM10[32] but it is noted that the initiative included measures targeting other commercial vehicles as well.

3.1.1.3 Noise levels

Mandatory and voluntary schemes

None of the research tasks sourced any empirical data on noise reduction. It was inferred by interviewees that CNG and electric vehicles are quieter to drive. However, noise still arises from the act of tipping and compacting (in the case of RCVs) the waste and recycling. Noise reduction impact is potentially significant if moving to smaller vehicles or e-cargo bicycles as seen in the Putney BID example,[33] but their applicability and scalability is untested.

Certain cases had defined collection times. This potentially helps manage overall noise pollution if the collection times are outside busy congestion times, which are associated with higher background noise levels, but might be perceived by residents as moving the noisy activity of waste collection to antisocial hours.

3.1.2 Secondary impacts of interest

3.1.2.1 CO_2eq from waste

Mandatory and voluntary schemes

Very limited empirical data associated with changes in waste treatment were sourced for either mandatory or voluntary CWZs. The impact on a reduction in CO_2eq is associated with the diversion from landfill through increased recycling. The section above details cases where the recycling rate has increased, and this would result in a reduction of CO_2eq from the waste treatment.

The voluntary CWZ scheme (BID) in Putney estimated that over one tonne of CO_2eq [34] was avoided each month in the first six months of the Putney Pedals scheme in 2020/21.[35] However, this data has not been continually collected since the first estimate was calculated and no further data on this CO_2eq could be provided.

3.1.2.2 Service quality and consistency of service

Mandatory schemes

In Los Angeles, customer enquiries and complaints are handled by local government rather than the waste management companies. The local government liaises with the contracted WMCs and track their performance.[36] Initially, when the CWZs were first implemented, there were many complaints about customer service. According to articles published by the Los Angeles Times,[37]

[32] https://www.interregeurope.eu/good-practices/west-end-waste-consolidation
[33] Interview with an anonymous stakeholder, October 2022
[34] Calculation comes from data provided by WRAP which calculates the CO_2 saved by recycling materials rather than sending them to landfill.
[35] ReLondon (Undated). Case study-Putney Pedals ramps up recycling on busiest high street in London
[36] LASAN (2013) Final Implementation Plan for Exclusive Commercial and Multifamily Franchise Haulier System
[37] Zahnister, D. (2018). LA's new recycling program has more than 28,000 complaints for missed trash pickup. Los Angeles Times.

between July 2017 and January 2018 more than 28,000 reports were filed for missed collections. As a result, the local government implemented financial penalties for WMCs if they failed to address missed collections within a certain timeframe. For example, if a WMC received a complaint before 2pm, it must be addressed by 6pm, and if they receive a complaint about a missed collection after 2pm, it must be addressed by 10am the next day.[38] As no baseline was taken on this factor, it is not possible to say if there has been an increase in service performance and customer satisfaction.

Voluntary schemes

The research identified a high degree of service flexibility and focus on customer satisfaction associated with the involvement of the BID. In the Baker Street BID, for example, businesses can express any dissatisfaction with customer service or service delivery and the BID can advocate on their behalf to achieve a suitable outcome for both parties.[39] In the Putney BID, businesses expressed their appreciation of the increased flexibility that the pedal scheme provided as it offered collections at times where other RCVs couldn't due to the council-imposed time restrictions. They also appreciated the door-to-door approach of customer service as they were able to engage with the collection operative and develop a working relationship.[40]

3.1.2.3 Costs of waste collection services for businesses

Mandatory schemes

From the interviews with representatives involved in mandatory CWZ cases it was noted that the impact on business waste collection costs varied.[41] According to interviewees, the design and communication of the scheme pricing structure is significant regarding how it does/doesn't incentivise customers to recycle more.

In Los Angeles, collection costs increased for some businesses as they were not taking advantage of the rates structure[42] where it costs more for residual waste collection than recycling. Businesses that increased their recycling rates saw more cost savings according to one interviewee. There were also extra charges for collecting bins that are not presented kerbside or are behind restricted access gates.[43] In some instances, these charges exceeded the standard base collection rate.[44]

There is no evidence that costs changed significantly pre and post implementation in San Jose. Costs for most businesses were competitive with rates found in other nearby locations without CWZs.[45] A rate structure was developed to incentivise activities (such as recycling) that would meet the city's environmental goals, whilst also achieving the waste contractor's total revenue

[38] Zahnister, D. (2018). LA's new recycling program has more than 28,000 complaints for missed trash pickup. Los Angeles Times.
[39] Interview with an anonymous stakeholder, October 2022
[40] Interview with an anonymous stakeholder, October 2022
[41] Interviews with anonymous stakeholders, October 2022.
[42] Interview with an anonymous stakeholder, October 2022
[43] Los Angeles Times (2019). L.A. trash hauliers will drop some of their fees- and the city will help pay the tab
[44] Interview with an anonymous stakeholder, October 2022
[45] Stufflebea & Horwede (2011). Commercial solid waste and recyclable material collection franchise agreement between the city of San Jose and Allied waste services of Santa Clara. City of San Jose.

requirements.[46] WMCs can apply to the local authority to change their prices annually to ensure costs are being met. Costs for businesses differ between the dry and wet (organic) bin.[47] As the dry bin is cheaper, many businesses do not have a wet bin.[48] This will change in the future due to the implementation of state-wide legislation which will make it mandatory for commercial businesses to recycle organic waste.[49] This may result in cost increases for businesses that have not already been using a wet bin system.

Voluntary schemes

It was clear from all the interviews that the group purchasing power of a BID could potentially secure a reduced rate for businesses. By offering a preferred supplier(s) in a voluntary CWZ, businesses potentially have the option to choose a less expensive waste management service. This was a central driver of the implementation of voluntary zoning as it had to appeal to businesses to drive them to switch WMCs and join the preferred supplier. The benefit for the WMC was that they would gain marketing support from the BID to promote themselves to members and so increasing their overall revenue. The interviewees from the voluntary schemes were unable to quantify changes in costs to businesses exactly, however some BIDs reported that there was a 15-20% discount on service with the preferred supplier.[50]

In Better Bankside BID, if businesses sign up to the service operated by preferred supplier, Recorra, they become eligible for a free annual allocation of paper, cans and plastic containers sacks, with most businesses receiving between 200-400 sacks. This equates to an approximate saving of £142-£284 per year.[51] Businesses also receive a 15% discount on food waste sacks, free quarterly electrical waste collection and further discounts on general waste and cardboard collections.[52] It is noted that there is no linked data to recycling performance. Appendix 7 presents a detailed case study.

One of the WMCs stated that they were able to reduce their costs to service a BID due to the increase in customers provided through the BID and the increased operational efficiencies that came from increased route density.

One suggestion made during the workshop was that the local authority or BID could provide business rate rebates in exchange for them using the approved BID WMC. The view expressed was that the waste contractors would work between the WMC and business exclusively and the WMC would be compelled to report its waste data to both the business and to the local authority. This suggestion was not explored further in the workshop nor additional research carried out, but, is captured in Section 5 as something that might be worth looking at further.

[46] Stufflebea & Horwede (2011). Commercial solid waste and recyclable material collection franchise agreement between the city of San Jose and Allied Waste Services of Santa Clara. City of San Jose.
[47] The wet container collects organic materials and food-soiled cardboard, and the dry container collects dry recyclables, residual waste, and glass
[48] Interview with an anonymous stakeholder, October 2022
[49] Cal Recycle (Undated). New Statewide Mandatory Organic Waste Collection.
[50] Interview with an anonymous stakeholder, October 2022
[51] Better Bankside BID (Undated) Recycling.
[52] Better Bankside BID (Undated) Recycling.

3.1.2.4 Data quality on commercial recycling

Mandatory schemes

To comply with legislation and meet its diversion goals, it is a requirement of the WMC in Los Angeles to provide the local government with waste data. The previous waste contractor permit system did not allow the city to effectively monitor or track recycling, due to limited reporting requirements and because additional information was challenging to gather.[53] Historically, pre zoning, the waste management companies expressed concerns regarding confidentiality when providing data to LASAN as they believed the information could be used by other WMCs to gain a competitive advantage.[54] Furthermore, there were no basic standards for what information should be gathered by WMCs and tracking material flow was challenging. Waste management companies delivered material to over 200 different facilities and a number of these facilities were located outside the city boundaries.[55]

According to an interviewee, the implementation of the CWZ has improved data quality on commercial recycling:[56] the city was able to establish and enforce consistent and timely reporting requirements for its WMCs; WMCs must conduct waste composition analyses twice a year, with 800-900 categorisations for each bin; and the material facilities are also required to provide tonnage data.

The San Jose Commercial Recycling and Garbage Service generally collects good quality data on commercial recycling according to one person interviewed.[57] The service provider for the zone, Republic Services, is required to provide the Department for Environmental Services with waste reports and data on request, and required to provide customer service. This requirement is built into the contract and financial penalties are issued if they don't provide the data on time or provide the required level of customer service.[58]

The Recycling and Garbage service in San Jose is dependent on businesses within the city subscribing and this ultimately has an impact on data quality. Compliance with the municipal code, including participating in the service, is ensured by having two environmental inspectors. The environmental inspectors also ensure that no other waste management companies conduct a commercial solid waste and recycling collection service in the city.[59]

Voluntary schemes

Interviews found that data quality and collection were a selling point when getting customers to sign up to the preferred waste contractors. In some of the schemes, businesses received tailored waste data and carbon impact reports which helped them to meet requirements related to carbon

[53] LASAN (2013) Final Implementation Plan for Exclusive Commercial and Multifamily Franchise Haulier System
[54] LASAN (2013) Final Implementation Plan for Exclusive Commercial and Multifamily Franchise Haulier System
[55] LASAN (2013) Final Implementation Plan for Exclusive Commercial and Multifamily Franchise Haulier System
[56] Interview with an anonymous stakeholder, October 2022
[57] Interview with an anonymous stakeholder, October 2022
[58] San Jose Liquidated Damages Framework
[59] Stufflebean & Horwede (2011). Commercial solid waste and recyclable material collection franchise agreement between the city of San Jose and Allied Waste Services of Santa Clara. City of San Jose.

accounting and reporting.[60] This worked as in incentive for businesses to sign up to the preferred waste management company promoted within a voluntary scheme. It was noted, however, that there was no mandatory reporting of data from the WMCs to the BID or customers, therefore the ongoing data measurement of the recycling rates for example has not been able to be quantified.

3.1.2.5 Presentation of containers

Mandatory schemes

In San Jose organic material including food contaminated cardboard is collected in the "wet container", and the "dry container" collects dry recyclables, residual waste, and glass.[61] Historically, some businesses only had dry bins as they were cheaper resulting in 'wet' waste contaminating the bins.[62] As a result, the implementation of the Recycling and Garbage Service for commercial waste has led to a decrease in the quality of presentation of the dry waste bins for recycling. A new Californian Law requires all commercial businesses to recycle organic materials.[63] A key intention of the change is that contamination levels will decrease, and recycling rates will improve.

Voluntary schemes

The use of e-cargo bikes provides flexibility and accessibility of collections.[64] The same could be seen in the Essential Edinburgh examples. Here there was more flexibility for material to be collected internally meaning the waste and recycling did not need to be presented on the street, avoiding concern of fines from the local authority for presenting waste at incorrect times.[65]

3.1.2.6 Collection timings

Mandatory schemes

Neither information in the public domain nor interviews provided evidence on any changes in collection timings pre and post implementation of zoning.

Voluntary schemes

The Putney Pedals Scheme has helped businesses to address their struggles with Wandsworth Councils time-bands for commercial waste collection. Congestion on the high street caused issues with waste collections as the collection hours did not align with business opening times. Businesses found it challenging to find waste management companies that would collect from the high street and there were often delays to collections. This put businesses at risk of receiving fixed penalty notices.

[60] Interview with an anonymous stakeholder, October 2022
[61] Republic Services (Undated). Business Collection Services Guide.
[62] Interview with an anonymous stakeholder, October 2022
[63] CalRecycle (undated). Mandatory Commercial Organics Recycling.
[64] Interview with an anonymous stakeholder, October 2022
[65] Interview with an anonymous stakeholder, October 2022

3.1.3 Planning, procurement, and set-up

3.1.3.1 Planning and consultation process

Mandatory Schemes

Interviews explored the consultation process in Los Angeles and San Jose, both of which carried out extensive consultation with stakeholders prior to the procurement process. In Los Angeles the consultation took place over six years and in San Jose, it took place over five years.[66]

Consultation in New York City totalled eight to nine years, beginning in 2014, passing into Law in 2019, and with a potential implementation date in 2022 or 2023. Consultation with stakeholders took the form of face-to-face presentations, focus groups, surveys and stakeholder workshops.[67] The New York City Sanitation Department (known as the DSNY) acknowledged that the Covid-19 pandemic had an impact on the implementation date.

New York City conducted a data gathering and modelling phase before proceeding. This included using multiple consultancies specialising in data modelling to estimate the current micro level detail on air quality, market cost and routing analysis. This research was done prior to enacting new primary legislation and the step by-step approaches taken are detailed in the DSNY's published Plan for implementing CMZs in New York City titled *Commercial Waste Zoning: A Plan to Reform, Reroute, and Revitalize Private Carting in New York City*[68].

During the planning process for the CWZ, LASAN drafted an environmental review which was put out to consultation with stakeholders to gather views.[69] Stakeholders including public, businesses, waste contractors and environmental groups were consulted on the plans for the CWZs and to promote the benefits of zoning.[70]

In San Jose, a lot of the stakeholder outreach was outsourced to partners.[71] They partnered with a university who went door to door to conduct surveys with businesses. They also hired consultants who conducted focus groups and workshops with businesses and waste contractors.

Significant pushback was seen from the Construction and Demolition (C&D) sector during stakeholder engagement. This sector felt that zoning would put many of the C&D specialist waste contractors out of business. As a result, the C&D sector was not included in the zoning. This trend to exclude C&D has been seen in all of the voluntary and mandatory examples. Other specialist waste collections such as confidential paper shredding have also been omitted from zoning plans.

Voluntary Schemes

The voluntary schemes such as Better Bankside, Essential Edinburgh, Baker Street and Norwich took similar approaches to consultation. Consultation by BIDs included a mix of face-to-face meetings,

[66] Interview with anonymous stakeholders, October 2022
[67] Interview with an anonymous stakeholder, October 2022
[68] DSNY (undated) *Commercial Waste Zones: A Plan to Reform, Reroute and Revitalise Private Carting in New York City*
[69] Interview with an anonymous stakeholder, October 2022
[70] LASAN (2013) City-wide exclusive franchise system for municipal solid waste collection and handling
[71] Interview with an anonymous stakeholder, October 2022

workshops with businesses and other stakeholders, and surveys to understand what services businesses were using, what they needed from a waste contractor and whether they were willing to switch waste contractors.[72] This information was used to help determine the bidding process including writing the tender and its evaluation methodology.

The approach to consultation taken by voluntary CWZs is different to the mandatory CWZs. With voluntary schemes, the consultation process aimed to inform BIDs on how to select a preferred waste contractor. Whilst the mandatory CWZs schemes also used the consultation process to gather views on services, there was more emphasis on using the consultation to sell the benefits of the CWZs with the voluntary schemes.[73]

3.1.3.2 Procurement process

Mandatory Schemes

Los Angeles, San Jose, and New York City each had one bidding process through which waste contractors could submit proposals. Each of the cities set out different requirements for waste contractors.

In Los Angeles, there were a total of 11 CWZs, however one waste contractor couldn't control more than 49% of zones.[74] The consultation process allowed LASAN to identify the potential risks of zoning implementation which they were able to mitigate through the design of their bidding process. There were concerns that small waste contractors would not be able to compete with larger ones and therefore implementation of zoning would not be commercially viable for them.[75] As a result LASAN designed the CWZs to include smaller zones. If the WMC was successful in being awarded one of these zones, they were not able to bid for a larger one. This disincentivised the larger WMCs from bidding for the smaller zones and allowed the SME WMCs competition with other similar sized WMCs and not the largest dominating of them.[76]

Each of these cities weighted evaluation criteria. New York City evaluated bids on price (35%), technical proposal (35%) and capacity and operations (30%).[77] New York City also required collection of recyclables and organic waste to be priced 30% lower than residual waste.[78] In San Jose, bids were weighted 30% on price, 35% on technical proposal, 30% on qualifications and experience, and 5% on environmental stewardship.[79] Los Angeles weighted bids 20% on price, 20% service plan, 25% customer service/transition plan, 25% diversion plan/innovation and 10% qualifications.[80]

[72] Interview with an anonymous stakeholder, October 2022
[73] Interview with an anonymous stakeholder, October 2022
[74] Interviews conducted in October 2022.
[75] Interview with an anonymous stakeholder, October 2022
[76] Interview with an anonymous stakeholder, October 2022
[77] DSNY (2021) Commercial Waste Zone Implementation
[78] DSNY (2021) Commercial Waste Zone Implementation
[79] Stufflebean & Johnson (2011). Report on requests for proposals for commercial solid waste system. City of San Jose.
[80] LASAN. (2014). Request for proposals. City-wide exclusive franchise system for municipal solid waste collection and handling.

The bidding process in Los Angeles took approximately eight months from the bid going live. The waste contractors had four months to develop their proposals. The authority then took three months to evaluate the bids and one month to conduct waste contractor interviews.[81] Different teams were assigned for each of the evaluation criteria and were forbidden from discussing scores with each other. Teams met approximately twice a week for the three-month period. This meant that the bids could be evaluated solely on price or service plan, for example, without the influence of other portions on the bid.

Voluntary Schemes

The consultation and planning process helped BID managers to understand business needs and what criteria would incentivise them to switch to the preferred suppliers,[82] helping them design the tender. In Norwich, businesses were consulted by the BID on this via survey, the results of which were shared with waste contractors to support writing high quality bids.[83] Some of the BIDs put more emphasis on price than others. One of the interviewees highlighted that cheapest suppliers may have limited services which will not encourage businesses to switch.

Putney BID has now gone through the bidding process twice. The first time, not many bids were received and half of them were of poor quality.[84] They didn't understand that that collections needed to be made from consolidation points and therefore their bids were not considered. Interviews found that this was because the requirements were too vague.

3.1.3.3 Contract

Mandatory Schemes

The contract length of the mandatory CWZ of San Jose was 15 years.[85] In Los Angeles, the waste contractors required a long contract period as they would need at least seven years to pay off initial investments into new CNG vehicles.[86] Appendix 9 and Appendix 10 detail the scope of contracts for mandatory cases researched.

Barcelona provided an example of a mandated collection in its approach to zoning. The local authority provides businesses with two options for managing their waste collection: they can choose to have their waste collected using the public municipal collection system or they can use a registered private waste collection service contracted directly by the business. The public collection service has been structured into collection areas or zones.[87] The purpose of zoning was, in part, to try different approaches to separate collection of food waste.[88] Some contractors would offer separate door-to-door organics collection systems; some would offer on street smart bins with

[81] LASAN. (2014). Request for proposals. City-wide exclusive franchise system for municipal solid waste collection and handling.
[82] Interview with an anonymous stakeholder, October 2022
[83] Interview with an anonymous stakeholder, October 2022
[84] Interview with an anonymous stakeholder, October 2022
[85] Interviews conducted in October 2022
[86] Interview with an anonymous stakeholder, October 2022
[87] Interview with an anonymous stakeholder, October 2022
[88] Interview with an anonymous stakeholder, October 2022

either contactless access or using a chip and pin system, providing a key card for households and small businesses.[89]

During the interview with the representative of the Waste Agency of Catalonia, it was understood that businesses are split into three types of commercial waste producers:

- Small – able to use on street organic waste bins, similar to householders.
- Medium – defined as medium if they had >900L of organic and general waste per annum, they had a door-to-door public collection system, but they could alternatively choose a registered private one.
- Large (e.g. hospital or university) – they could use a private waste contractor and didn't have to request permission from the municipality authority to do so.

Both small and medium sized businesses had to use the municipality provided waste collection service, however, if the medium sized business was achieving good levels of recycling, they could get permission from the local authority to use a private waste contractor.[90] It was understood from the interview that both prices for the zone appointed private company and the public collection system were equal and set as a standard. This could not be verified by the Barcelona municipality authority. They created four zones for the public collection service (that include collection from households and some commercial business) and accepted bids from seven waste contractors and award four contracts to four separate contractors.[91]

Voluntary Schemes

All of the voluntary schemes interviewed had five-year contracts with review periods built in. Putney BID has recently changed to a one-year contract period with the option to extend.

It was estimated, based on the BIDs interviewed, that around 40-50% of the businesses in the BID had signed up to the preferred supplier after a period of 6-18 months.[92] This percentage uptake was seen as the "low hanging fruit". The latter 50-60% of businesses were seen to be in long term or national contracts which, whilst not impossible to cease with their current contractor, would take longer and were more complex to end.

3.1.4 Stakeholder workshop views on priority impact areas

Through the workshop it was possible to explore attendees' perspective and thoughts on the impact that zoning could have on the areas described in section 3.1 above. Attendees were asked to place post-it notes to vote on where they felt zoning would have an impact. Photos from this exercise can be seen in Appendix 11. Figure 4 shows the votes for where it was felt zoning would have the most impact through to the least impact.

[89] Interview with an anonymous stakeholder, October 2022
[90] Interview with an anonymous stakeholder, October 2022
[91] Ajuntament de Barcelona (undated) Waste collection for shops and large generators
[92] Interview in October 2022 with multiple BIDs

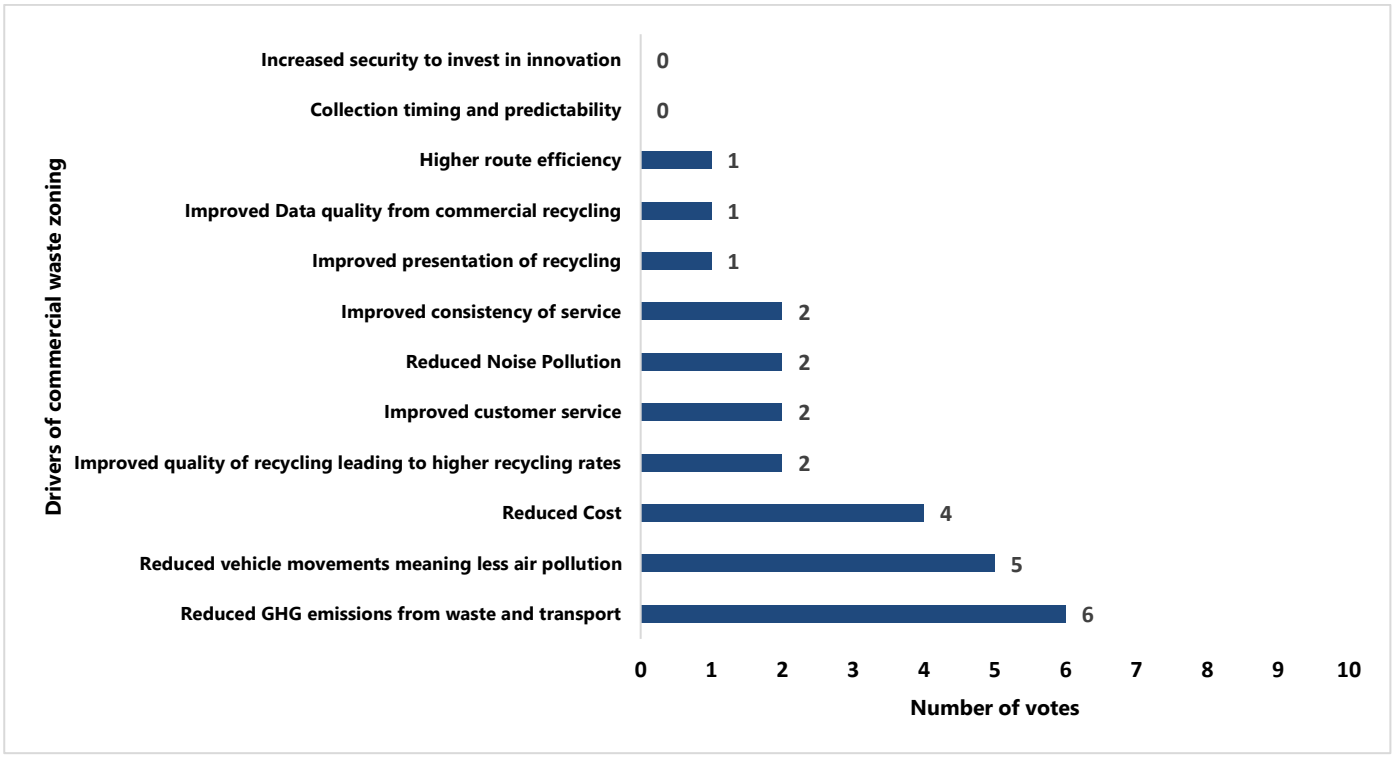

Figure 4: Stakeholder opinions on where zoning would have the largest impact

Figure 4 shows that workshop attendees considered GHG emissions from waste and transport and air quality, a reduction in vehicle movements and reduced cost as being the areas where zoning could potentially have the greatest impact. These areas align well with the intended aims of zoning reviewed as part of this research across both mandatory and voluntary cases. Interestingly, some of the more nuanced potential impacts of zoning, such as around collection times and data quality, did not gain many or any (in the case of the former) votes. It is noted that the workshop included a small number of stakeholders representing specific perspectives and captured views at a specific point in time.

3.2 Stakeholders SWOT

The following tables summarise the research findings to present a SWOT analysis for key stakeholders in relation to introducing zoning. This SWOT analysis was based on all eight cases covered during the research, including four voluntary and four mandatory cases.

See also Appendix 2 for a summary of the initial rapid SWOT carried out on a selection of six cases early in the research before any interviews or workshops had been completed.

3.2.1 Waste contractors

Table 2: Waste Contractor SWOT analysis

STRENGTHS	WEAKNESS
- Zoning can help stimulate innovative operational improvements, e.g. when taking a mandatory approach which stipulates that waste contractors must use low/zero emission vehicles. - By winning a zone, waste contractors can streamline their operations including route efficiency, service delivery, sales prospecting and communications, as evidenced in both mandatory and voluntary cases.	- Some waste contractors lose business if they do not win a zone, as evidenced in mandatory cases. - As with the introduction of any service, poorly designed CWZ schemes could result in poor customer experience over the transition period. - Poorly communicated service leads to confusion and poor recycling rates. - Poorly designed pricing structures can lead to businesses paying higher collection costs. - Potential that existing depot locations for waste collection companies are not in optimal location based on zoning design. - How zoning addresses national businesses with national waste management contracts.
OPPORTUNITY	**THREAT**
- Waste contractors that win zones may benefit financially from increased business, greater route efficiency and less contaminated bins. - A well-designed CWZ could provide opportunities for SME waste contractors to grow and develop their service provision. - Potential for partnership arrangements to develop and sub-contracting opportunities to facilitate sharing of expertise and resources.	- If smaller waste contractors have high route density prior to zoning they could disproportionately lose out on more contracts if they were unsuccessful in winning a zone. - SME waste contractors could lose out financially if they must reduce their prices in order to win a zone(s). - If a contractor wins a zone(s) that is logistically far away from their depot, fuel use and vehicle movement would increase. - The local authority could decide to bid for a zone or multiple zones to deliver a

	commercial waste service at the expense of existing waste contractors.

3.2.2 Local/national government action on waste targets

Table 3: Local / National waste targets SWOT analysis

STRENGTHS	WEAKNESS
- In all cases, zoning allowed the zone managers to target the recycling of specific waste streams including food waste, which have significant impact on commercial recycling rates and GHG emissions from waste. - In some of the voluntary cases, zoning allowed the zone managers and waste contractors to improve communication and messaging on waste regulations and business recycling services which increased recycling rates and improved the quality of the recyclate. - In the mandatory cases, recycling rates and tonnages of waste diverted from landfill increased. However, recycling rates in the mandatory cases mainly increased as previously recycling was not mandated. - In all cases, zoning improved the quantity and quality of data on commercial waste management.	- In one of the mandatory cases where a wet dry bin system was implemented, contamination increased. - In some of the voluntary cases, data recording and reporting dropped off after the initial stages of the project. This could be fixed by better enforcement and encouragement for businesses and waste contractors.
OPPORTUNITY	**THREAT**
- Zoning and mandating the collection of commercial waste data may help support the develop and monitoring of local/national waste targets.	- Poorly designed zoning schemes and/or recycling performance targets regulations can result in poorer performance than anticipated.

3.2.3 Local authorities as a waste collection provider/regulator

Table 4: Local authority SWOT analysis

STRENGTHS	WEAKNESS
- In mandatory cases, requirements for waste contractors to provide waste data helped the local authority to monitor the performance of businesses against their waste and recycling goals. - In mandatory cases, recycling rates and tonnages of waste diverted from landfill increased. However, this was often due to recycling previously not being mandated. - In voluntary cases, the presentation of waste containers on the street improved, contributing to less litter and more visually appealing streets.	- Potentially negative impact on successful outcomes if there is a lack of available and appropriate resources to plan, procure and manage zoning by local authorities.
OPPORTUNITY	**THREAT**
- Zoning has the potential for better waste presentation compliance leading to fewer local authority penalties being issued. - The local authority could decide to bid for a zone or multiple zones to deliver a commercial waste service which may be financially beneficial.	- There is a risk that waste contractors may underperform if not regulated adequately. This would place an administrative and financial burden on local authorities. - Mandatory zoning may provide a risk to in-house local authority commercial waste collection services if they are not awarded the contract to provide collections.

3.2.4 The public

Table 5: The Public SWOT analysis

STRENGTHS	WEAKNESS
- Both mandatory and voluntary zoning cases resulted in: o Improved air quality and reduction in congestion. o Reduction in vehicle traffic. o Reduction in vehicle emissions by transitioning to low emission vehicles or e-cargo bikes.	- Both mandatory and voluntary CWZs that restrict the collection of waste by location and/or time are not eliminating impact (sight and sound), just moving it to a different place and/or time.
OPPORTUNITY	**THREAT**
- Both mandatory and voluntary CWZs can be designed to reduce: o pollution and congestion- GHG emissions. o noise pollution. o litter.	- If the CWZ stipulates collection during anti-social hours this might raise significant public objection from residents.

3.2.5 Businesses (procuring waste collection service)

Table 6: Business SWOT analysis

STRENGTHS	WEAKNESS
- Costs decreased in the voluntary examples of zoning. The group purchasing power of the BIDs secured a reduced rate for the businesses and this was communicated to all BID members. The reduced rate was one of the attractive pulls to move businesses to move to the preferred WMC. - Improved data provision by the WMC.	- In mandatory zoning, businesses are no longer offered a free choice with their WMC and are unable to move if they are dissatisfied with costs or services. - In Los Angeles, for example, poor rollout resulted in missed collections which negatively impacted businesses. Financial penalties for missed collection could improve this. - In another mandatory example, the costs of waste collection for some businesses increased due to add-on-fees for driving up long driveways or having to use an inter-com to get past private locked gates. - In Los Angeles, they also found that initial customer service was poor with missed collections frequent due to waste contractors struggling with the increase in business
OPPORTUNITY	**THREAT**
- Whilst reduced collection costs were not seen across the board in the mandatory examples examined, there is the opportunity for schemes to be designed in a manner that would facilitate this. - Improved service including data. - By using a competitive procurement bidding system, zoning can potentially ensure that collection prices remain competitive, and businesses get value for money. - Zoning can provide an opportunity to simplify and/or standardise the waste collection process for all businesses, with intermediaries such as the BID or local authority dealing with concerns about service quality and holding waste contractors accountable. - Encouragement and education from the local authority and waste contractors could help business reduce their costs through recycling	- If prices were to be higher with the zoning operator, business wouldn't be able to change provider and they would have to absorb any price increases which could adversely affect business finances.

(and therefore increase recycling volumes) if pricing is designed to incentivise this.	

3.3 Regulatory review

3.3.1 Mandatory CWZ

The research recorded what regulations were used to commence mandatory CWZs in the US and one European example. The overall aim of establishing a CWZ was aligned with the general move towards increasing recycling rates, particularly for organics. Appendix 12 details the key legislation used and cross references it with any existing and comparable Scottish legislation frameworks where possible.

3.3.1.1 California waste legislation

The state of California has some of the strictest environmental laws in the USA. It has introduced several laws to specifically reduce GHG emissions arising from solid waste management collection and treatment. These bills (see list below) have ambitious targets to reduce solid waste collected within California being sent to landfill through increased recycling. The introduction of CWZ franchise schemes will enable commercial businesses to comply with these regulations and meet the state recycling targets. The commercial waste franchise system aims to reduce the amount of waste landfilled through increased recycling as well as improve data on recycling collections.

- Assembly Bill 939, known as The California Integrated Waste Management Act of 1989, required the state of California to develop a waste management plan that includes recycling, source reduction and composting. The source reduction and recycling part of the act was required to divert 50% of solid waste from landfill by 1 January 2000.[93]
- Assembly Bill 32 was passed in 2006 and is also known as the Global Warming Solutions Act. This sets out a multi-year programme to reduce GHG emissions in California.[94]
- Assembly Bill 341, also known as the Mandatory Commercial Recycling Regulation, was introduced in 2012. The purpose of this law is to reduce GHG emissions in California. This piece of legislation is one of the most significant legislative pieces introduced to California since the introduction of AB 939. The bill requires mandatory commercial recycling in California.
- Assembly Bill 1826 is known as the Mandatory Organics Recycling Law and became effective in 2016. This law requires businesses that generate two cubic yards of organic waste per week to arrange an organics collection.[95] This law applies to multi-family dwellings as well as schools, restaurants, shops and hospitals.[96] The act is designed to help

[93] El Dorado County (undated) The Intergrated Waste Management Act – AB 939
[94] California Air Resources Board (2018) AB 32 Global Warming Solutions Act of 2006
[95] https://rethinkwaste.org/wp-content/uploads/2019/07/ab-1826-brochure.original-1.pdf
[96] California Legislative Information (2014) AB-1826 Solid waste: organic waste

California reach its goal of 50% waste diversion by 2020 and 75% organics diversion by 2025.[97]

All four assembly bills introduced in California were intended to reduce GHGs through the reduction of waste entering landfill. The introduction of CWZ schemes was viewed as an effective way of achieving the targets set out within the bills following extensive consultation and research during the planning stage.

3.3.1.2 Barcelona

Decree No. 1/2009 of July 2021[98] is a regulation that requires all commercial businesses in the region of Catalonia, including Barcelona, to separate their waste correctly and stipulates mandatory organics recycling. The decree also regulates the use of the types of organics collection established in each waste zone of Barcelona.

3.3.1.3 New York City

The Mayor of New York City signed LL199 into law in 2019.[99] This required New York City to establish CWZs throughout the locality.[100] This is a local law which amends the New York City charter and administrative code to introduce a commercial waste zone system. At the time of writing, the implementation of the CWZ has yet to commence, with the contract award announcements expected by the end of 2022 or early 2023. It is expected that full implementation will not take place until 2024. The New York City example has a broad list of aims against which impact was required, as seen in 0.

3.3.2 Voluntary CWZ

In the UK, voluntary CWZs are operated by BIDs. These were introduced in Scotland in 2007 as a result of primary legislation in Part 9 of the Planning etc (Scotland) Act 2006 and other secondary legislation, including UK parliamentary regulations needed to implement reserved aspects of the policy. In England, legislation was introduced in 2004 through the Business Improvements Districts (England) Regulations.

Part 9 of the Planning etc. (Scotland) Act 2006 allows local authorities to create "BID arrangements" with respect to all or part of the area of the authority.[101] The purpose of the "BID arrangement" is to facilitate projects to be carried out for the benefit of those who work, live, or conduct any activity in the district. "BID arrangements" are not able to come into force unless the BID proposals are approved by a ballot. There are restrictions and rules in regard to the ballot process. BID arrangements can last up to five years and may be renewed following the appropriate ballot process.

[97] https://rethinkwaste.org/wp-content/uploads/2019/07/ab-1826-brochure.original-1.pdf
[98] Ajuntament de Barcelona (undated). Waste collection for shops and large generators.
[99] NSNY (2019). Commercial waste Zones.
[100] DSNY (2019) Commercial Waste Zones.
[101] Planning etc. (Scotland) Act 2006 Part 9 Planning etc. (Scotland) Act 2006 Part 9

3.3.3 Scottish Regulatory landscape

This section sets out existing Scottish Regulations and Acts that cover relevant areas when considering CWZs and the potential impacts they look to achieve.

3.3.3.1 Waste (Scotland) Regulations 2012

The Waste (Scotland) Regulations 2012[102] stipulate the obligation on the different holders of waste. It specifies the duty of care practices expected in relation to recycling and waste management, including commercial businesses, in Scotland. The Waste (Scotland) Regulations stipulated that the holders and producers of waste must take "reasonable steps" to increase the quality and quantity of recyclable materials.[103]

The regulations set out that the following materials must be presented for recycling:[104]

- Paper;
- Cardboard;
- Plastic (including drinks bottles and rinsed empty food containers);
- Metal (including cans and tins);
- Glass (including drinks bottles and rinsed empty food jars); and
- Food waste if businesses produce over 5kg of food waste per week.[105] There are exceptions for businesses to do this in rural areas.

Recycling streams must be presented separately for collection, and materials kept separate from each other from point of wastage through to their collection.

If there is non-compliance of the duty of care expected in the Waste (Scotland) Regulations, SEPA can issue fixed penalty notices up to £10,000.

3.3.3.2 The Environmental Protection Act (Section 47)

The Environmental Protection Act 1990 (Section 47)[106] allows local authorities to dictate how waste is presented i.e., the size, number and type of containers. It is a key piece of legislation which helped local authorities implement bins-off-street policies.

Amendments to the Act in June 2014 gave local authorities additional powers. If the commercial waste bin or bag is ''likely to cause a nuisance or be detrimental to the amenities of a locality", the local authority had powers to control the placing and removal of commercial waste bins or bags on the road through the issue of a statutory notice. This includes the power to decide the time that commercial waste bins or bags must be placed.[107] This enables the local authority to serve a notice restricting the placing of bins on the public road for collection but does not apply to private land. It

[102] https://www.legislation.gov.uk/sdsi/2012/9780111016657/contents
[103] https://www.gov.scot/publications/duty-care-code-practice/
[104] Zero Waste Scotland (Undated). Waste (Scotland) Regulations.
[105] Zero Waste Scotland (Undated). Waste (Scotland) Regulations.
[106] Environmental Protection Act 1990 (Section 47)
[107] City of Edinburgh Council Transport and Environment Committee (2015). Update on the Street Scene Project

also only allows for control over the time the waste is presented, not control over when the bin is emptied.

Bins-off-street policies have been implemented, so far, in five different towns/cities in Scotland: Edinburgh, Glasgow, Aberdeen, Inverness, and St Andrews. The aim of the bins-off-street policies is to reduce the negative environmental and visual impact of having commercial waste bins on the street and to improve the overall public realm experience. The bins-off-street policies were successfully implemented using the legal bases of the Environmental Protection Act 1990 (Section 47) and the Road Scotland Act 1984 (section 59 and 87).

3.3.3.3 Roads Scotland Act 1984 (Section 59 and 87)

The Roads Scotland Act 1984 (Section 59 and 87) gives local authorities the power to control or remove obstructions on public land.[108] Commercial waste bins may be considered an obstruction.

3.3.3.4 Traffic Regulation Orders

Traffic regulation orders (TROs) allow local authorities to impose restrictions such as the introduction of waiting or loading restrictions and road closures.[109] The legal powers to promote TROs comes from the Road Traffic Regulation Act 1984, following the process set out in *The Local Authorities Traffic Orders (Procedure) (Scotland) Regulations 1999* for how TROs are consulted on and advertised.[110]

Experimental traffic regulation orders (ETROs) can be used to trial schemes on the streets to understand how they work in practice. This allows councils to make a more informed decision as to whether to make the changes permanent. To make a trial (experimental) change permanent, local authorities would have to follow the TRO process. It is noted that restrictions could only be imposed based on the class of vehicle (e.g., HGV) as opposed to type of vehicle (e.g. no RCVs between 6am and 8am).

3.3.3.5 Better Regulations Agenda

The Scottish Government's Better Regulations Agenda aims to reduce "unnecessary burdens" on business by ensuring all regulation follows the Better Regulation principles. These principles apply to both voluntary and statutory regulation.

The four key principles of the Better Regulation Agenda are:[111]

1. **Proportionality:** The policy solutions must be appropriate to the risk posed and the costs identified and minimised. All alternative policy solutions must also be considered, as alternatives may be more effective and cheaper to apply.

[108] Roads (Scotland) Act 1984. Roads (Scotland) Act 1984.
[109] https://www.transport.gov.scot/transport-network/roads/road-orders-and-records-of-determination/#:~:text=Traffic%20Regulation%20Orders%20(TROs)%20impose,of%20waiting%20or%20loading%20restrictions.
[110] https://www.edinburgh.gov.uk/roads-travel-parking/street-schemes-proposals/4
[111] Better Regulation Task Force (2005). Regulation- Less is More

2. **Consistency:** Government rules and standards must be implemented fairly and consistently, and regulators should work together in a joined-up way. New regulations must consider existing or proposed legislation both at a domestic or international level and be predictable in order to give stability and certainty to those being regulated.
3. **Accountability:** Regulators must be able to justify their decisions and be subject to public scrutiny. This means that proposals should be published and consulted on before decisions are taken. The documents must be well-publicised and accessible. When those decisions have been taken, regulators must explain how and why their final decisions have been reached. Regulators should also establish clear standards and criteria for which they can be judged against and have clear lines of accountability to Ministers, Parliaments and Assemblies and the public.
4. **Transparency:** Regulators should be open and keep regulations simple and user-friendly. The policy objectives, including why the regulations are necessary, should be clearly defined and communicated effectively to all the interested parties. This includes conducting effective consultation which must take place before proposals are developed to ensure that stakeholders views and concerns are considered. This consultation period must last at least 12 weeks, so stakeholders have sufficient time to respond to the consultation documents. Regulations should be clear and simple and guidance should be issued in plain language 12 weeks before the legislation is to be taken into effect. Those being regulated must be made aware of their obligations, with law and best practice clearly distinguished. They should be given time and support, however, to comply and the consequences of non-compliance should be clear.

3.3.3.6 Stakeholder views on alternatives to zoning

At the stakeholder workshop, participants were asked to suggest alternative regulatory instruments or actions that could be implemented to affect change in each of the impact areas most often cited as being a driver for zoning. The purpose of this exercise was to assess alternatives to zoning in specific areas and to highlight where zoning could potentially be impactful due to limited alternatives. Table 7 details the alternative actions that could potentially be used as raised by the stakeholders at the workshop.

Table 7: Stakeholder workshop views on alternatives to CWZ to address drivers of zoning

What alternative action?	How would it be done?	What driver of CWZ would it be addressing
SEPA Enforcement	More investment into SEPA officers and monitoring. A task force approach to enforcement should be taken and SEPA should use a Section 34 of the EPA to issue Fixed Penalty Notices (FPN). It was suggested that by issuing FPN's SEPA can create	- Improved presentation of recycling. - Improved quality of recycling leading to higher recycling rates.

What alternative action?	How would it be done?	What driver of CWZ would it be addressing
	compliance through demonstrating the enforcement power they already have.	
FPN (Fixed Penalty Notice)	Section 47 (EPA) – this allows local authorities to dictate how waste is presented but not when its collected. Therefore, it could be amended to compel WMCs to conform to this. SEPA can use a section 34 of the EPA to issue an FPN. However, currently the FPN is too low and needs to be reviewed as it doesn't incentivise businesses to comply.	- Improved presentation of recycling. - Improved quality of recycling leading to higher recycling rates.
Waste data requirements	Take a tax return approach to individual waste data. The WMC would provide data to the business and they in turn would submit an annual "return" of the data.	- Improved Data quality from commercial recycling. - Improved quality of recycling leading to higher recycling rates.
Low Emission Zones (LEZ)	LEZs will charge WMCs if they have a non-compliant vehicle that emits higher emissions and air pollution than the required standard set in the zone.	- Reduced vehicle movements. - Improved air quality.
Timed access	Through the Road Traffic Regulation order. However, it was noted that this would apply to all HGVs not just RCVs.	- Collection timing and predictability.
Behaviour change action	Outreach to businesses to educate them on the Waste Regulations. Reduce cost for higher quality recycling.	- Improved quality of recycling leading to higher recycling rates.
Competitive market	Already in place with unfettered free market.	- Improved customer service. - Reduced costs. - Improved consistency of service.
Consolidation points	A point where businesses could take bags of waste and recycling; or	- Reduced vehicle movements.

What alternative action?	How would it be done?	What driver of CWZ would it be addressing
	A point the WMC would own/co-manage with local authority.	- Reduced noise pollution. - Improvement of predictability and consistency of service. - Reduced GHG emissions from transport.
Electronic tracking – including smart bins digitally accessed by a PIN or chip card/identifier	Reduced waste fraud by stopping people or business throwing their waste into other businesses or organisations bins.	- Improved data quality.

Figure 5 shows the number of alternatives offered to address the impacts. It can be seen the most alternatives were offered for: improving recycling quality, reducing GHGs from waste and transport, improving collection timings, waste data, customer service and presentation. There were no alternatives suggested to improve route efficiency or security to invest in innovation. See Appendix 11 for photos from the workshop exercise.

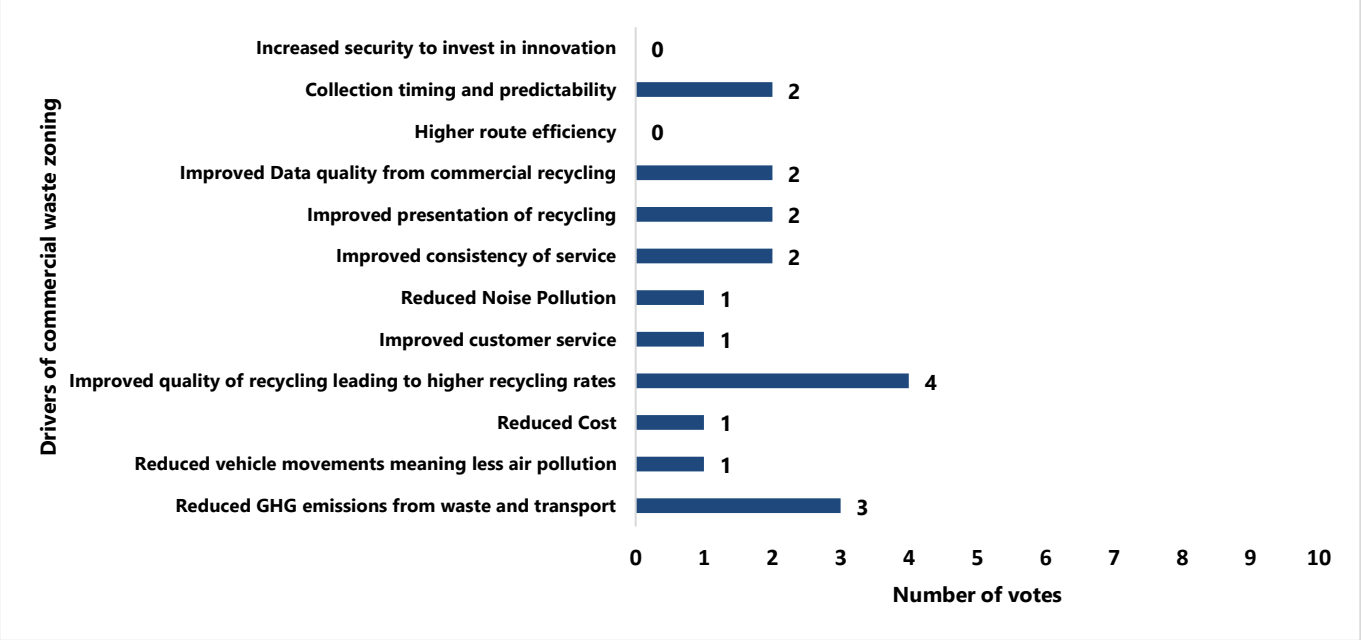

Figure 5: Number of potential alternative regulations / actions to zoning to affect change in impact areas

Workshop attendees agreed that many existing regulated powers provide the framework to target and address further some of the impacts, particularly relating to the improvement of urban environment (air quality, noise, presentation of waste/recycling on streets). Similarly, it was felt that further support would be needed to assist WMCs with data recording and reporting if it were to be a require of any zoning.

It is noted that there were no suggestions for alternative action on two potential impacts:

- improving route efficiency; or
- increasing innovation (accelerate service innovation/development related to commercial waste collections)

It is important to put this in context as the workshop was a small group of stakeholders and this should not be interpreted as meaning there are no alternatives. Route efficiency has been a central driver in USA cases moving to mandatory zoning. The route-mapping efficiency studies in New York City found that implementation of zoning could reduce vehicle transport movement by 50-70%[112](Appendix 13).

Secondly, it is noted that innovation can be defined in many ways regarding waste collections including expansion of materials collected, improved customer service, enhanced data provision, or modernisation of the fleet to cleaner lower emission vehicles. Whilst zoning may provide an opportunity to introduce innovative measures, this has been achieved through other means (for example, by introducing separate food waste collections). In the voluntary examples, innovation was seen in Putney BID with the e-cargo bike and in Essential Edinburgh and Baker Street with

[112] Sam Schwartz (2016). Memorandum.

eRCVs. It was discussed in the workshop that the cost for eRCV is 300% higher than for diesel RCVs and that mass scale adoption of eRCVs needs to see a financial intervention from policy makers or a change in the tax applied to electric vehicles in general.

4 Conclusions – applicability in Scotland

The findings from desk-based research and interviews have provided learnings from voluntary and mandatory commercial zoning in other locations. This section will put the learnings from these cases into the Scottish context and will begin to explore possible impacts of zoning in Scotland.

In assessing the applicability of CWZs it is important to put this research into context regarding the breadth and depth of the data and information sourced. Researching where impacts were recorded was a challenge as, across both types of zoning, there were almost no baselines taken prior to the implementation of zoning with the exception of some waste related data. However, the research was able to gather information through interviews to draw out motivations and aims of establishing a CWZ, any initial problems that were encountered including how they were mitigated and lessons learnt that others, including Scotland, could benefit from.

4.1 Potential impacts on recycling rates

The main driver of implementing zoning in Scotland would be to improve consistency, performance and compliance of commercial recycling.[113] Scotland is at a very different starting point than some of the researched examples when zoning was implemented. Scotland, for example, already has mandatory separate waste collections. However, in the mandatory CWZs observed in the USA examples, CWZ was used as a measure to mandate recycling. Whilst these examples saw increases in landfill diversion and recycling rates (once separate collections had been mandated) there are questions surrounding whether mandatory zoning will be sufficient to increase compliance among businesses that are not meeting their obligations.

BIDs in the UK, which brought in voluntary zoning, saw an increase in recycling rates. In part, this was due to the introduction of financial incentives created by making residual waste more expensive. The businesses within one BID benefitted from increased communication and education. Mandatory CWZs also have the potential to introduce financial incentives and increased education and communications. However, further research needs to be carried out to understand how either of these zoning types could impact recycling rates in Scotland.

4.2 Potential impacts on other environmental factors

Zoning has been implemented in other locations to reduce GHG emissions and improve air quality. The mandatory and voluntary schemes explored as part of this research facilitated and/or mandated the use of cleaner vehicles, increased route efficiency and reduction of vehicles. The introduction of mandatory or voluntary zoning in Scotland could also help to facilitate this.

Mandatory CWZs provide the opportunity to mandate the types of vehicles that can enter the zones. This can be in the form of a restriction to certain times or by vehicle type, both of which has the potential to impact noise pollution. Whilst low emission zones (LEZs) have been introduced in Aberdeen, Dundee, Edinburgh and Glasgow to decrease the presence of diesel vehicles, they can

[113] Scottish Government (2022) *Delivering Scotland's circular economy – route map to 2025 and beyond - consultation*

only be used under current legislation to restrict classes of vehicles, not their purpose.[114] For example, an LEZ could be used to restrict HGVs but could not be applied specifically to waste collection vehicles.

4.3 Additional learning points in a Scottish context

4.3.1 Planning and procurement

The planning time required to design and implement zoning, whether voluntary or mandatory should not be underestimated. This is a critical stage and adequate time must be allowed to conduct the research and model the potential impact that zoning can have on recycle rates and other priority factors. Time spent at this stage will help to mitigate some of the weakness and threats that were identified in the SWOT analysis. In the cases of New York City and Los Angeles, this research and planning stage took more than three years. Whilst Scottish cities are not as large, it is still a complicated and nuanced problem.

Other topics that may warrant further consideration regarding design of the zone and procurement process include:

- **Local authority conflict of interest:** In areas where local authorities provide waste collections, what role will they play regarding bidding and the evaluation of bids?
- **Contract length:** Findings have indicated that in determining the length of the contract awarded to WMC, there needs to be balance between allowing sufficient time for WMCs to invest in new equipment (e.g. cleaner vehicles) and ensuring they are incentivised to offer high quality service to remain competitive.
- **Customer service:** In the case of mandatory zoning, how will complaints and poor service quality be dealt with if it occurs?
- **Impact on WMCs:** Understanding the current profile of WMCs and providing opportunity for large and small operators needs to be considered.

4.3.2 The value of data

Data has value for government, businesses, and waste management companies. In the transition to a circular economy, and with new legislation around EPR and DRS on the near horizon, robust, consistently collected and reported data is essential. Scotland is involved in the digital waste tracking work. Being able to report waste at site level could be transformative for the waste collection value chain. Zoning cases studied have been associated with an improvement in data collection and reporting. Future legislation around digital waste tracking provides an opportunity to enhance data availability on waste.

[114] Low Emission Zones Scotland (2022) *About low emissions zones*

4.3.3 Pricing is a key motivator

For both mandatory and voluntary systems it is important that the pricing structure is designed to drive the desired behaviour of increased recycling. Where voluntary zoning is being introduced, knowledge of local market rates are essential to compete on price.

There were several occasions where interviewees suggested that local authorities could provide business rate rebates in exchange for using the local authority approved WMC. This is something that could be looked into further to assess the feasibility and practicalities of how and if it could work and the role it would play in driving improvements in recycling and reducing emissions, alongside considerations of zoning.

4.3.4 Communication is key

Communication across all stakeholders is vital at all stages, from informing impact assessment through to the smooth transition, and the full and proper use of the system if one is introduced. If further research is carried out to assess the potential costs and impacts of any form of zoning then clear and transparent communications on the aims, benefits and risks will be key. In one mandatory case the initial service quality was very poor due to the change from a two bin to three bin system, along with charges to bins which are access controlled via a smart lock[115]. The scale of change was significant and sudden, and the supporting service change communications didn't inform businesses of the changes in time. This resulted in a significant number of missed collections and customer dissatisfaction resulting in an increase in service costs.

4.4 Stakeholder needs

The research has highlighted the key needs of the major stakeholders in relation to the potential benefits and risks of implementing a CWZ to improve recycling rates and reduce associated emissions and pollution. Table 8 below summaries these needs and is a reference for any future design and engagement research.

Table 8: Summary needs of stakeholders related to commercial waste collections

Stakeholder	Needs
Business	- High quality service - Flexible reliable collections - Competitive price
Waste Contractors	- Competition to allow smaller WMCs to stay in the market alongside bigger WMCs - Clarity on service development requirements for costing - Route density as it leads to efficiencies and operation cost savings

[115] A smart lock control the opening of the waste bin lid only by users authorised by the Management Company. This could include via smartphone, RFID tags, magnetic cards…etc

Local authorities	- Reduced vehicle movements meaning less congestion - Innovative low emission vehicles - High quality data - Improved performance through higher recycling rates - Increase investment and innovation in the type and number of vehicles in an area
The public	- Less vehicle movement leading to improved public realm experience from lower noise and air pollution

One of the key points of concern identified relates to waste management companies and the consequences that introducing a mandated CWZ would have on the number of suppliers. During the workshop attendees were invited to express their views on the impact of implementing zoning. These were discussed and some actions that could be used to address some of the concerns are listed as below in Table 9. The concerns expressed from the WMCs were not exhaustive, however, they gave an indication of where they feel zoning could extend the dominance of large WMCs in the industry at the expense of the Scottish based WMCs.

Table 9: Concerns of the impact of zoning and considerations to address the concerns

Concerns	Consideration to address concerns based on workshop feedback
Could put SME WMCs out of business if they are unsuccessful in winning access to zones. Large WMCs can cushion the loss of access to a zone and the contracts they would potentially lose. Smaller WMCs that have developed high route density in what would become zones could lose disproportionately more of their contracts if they were unsuccessful in winning a zone.	- Create a mixed variety of zones, based not only on the environmental benefits resulting from reduced vehicle movements but also from existing market share. This will ensure zones have a high mix of existing WMCs in operation, so if one WMC was unsuccessful in keeping clients in that zone it would not affect the smaller WMCs. - Limit proportion of the total that any one provider can secure.
Could put SME WMCs out of business if they had to reduce their prices to keep their existing client base and this price reduction made it unprofitable to service the awarded zone.	- Application of wider procurement practices and duties including the public sector procurement 'sustainable procurement duty'. - Application and communication of specific measures to improve access to public contracts for SMEs, the third sector and supported businesses will reduce the risk of WMCs offering commercially unviable low prices to win the contract. - correct?

Concerns	Consideration to address concerns based on workshop feedback
A contractor could bid for multiple zones and end up only being successful in a zone that is logistically further away from their depot. This would result in them travelling through zones from which they are not collecting increasing fuel use and partially mitigating the reduction of vehicle movements in the affected zones.	- Consideration to be given to location of the depot or waste transfer station to avoid overlapping zones that are not in the WMCs contract. - Consider the operational feasibility and pros and cons of a centrally managed CWZ(s) waste transfer station.

4.5 The rural opportunity for CWZs?

4.5.1 Commercial waste collections in a rural setting

All the cases reviewed as part of this research were from an urban setting. As part of the research, a review of the number of waste contractors operating in each local authority area was carried out. Table 10 below notes the average number of waste contractors per type of local authority, with local authority types based on the family groupings from the Local Government Benchmarking Framework.[116] The family groupings were designed to distinguish the types of areas served by local authorities based on environmental, economic development, culture and leisure, and corporate and property indicators. The Scottish Government's *Urban Rural Classification 2020* was not used to compare local authorities as it is more appropriate for classifying data zones rather than local authorities.

When comparing the number of WMCs operating in urban areas with rural areas, the average number of waste contractors is significantly smaller in rural areas (Table 10). In rural local authorities there is an average of four waste contractors, compared to 14 waste contractors in urban local authorities. There is only a small difference, though, in the average number of waste contractors for semi-rural, semi-urban and urban local authorities. However, in Edinburgh and Glasgow there are 22 and 20 waste contractors respectively (see Appendix 14 for the full list of local authorities and the number of waste contractors).

[116] Local Government Benchmarking Framework (undated). How do we compare councils?

Table 10: Average number of waste contractors per local authority type

Local authority type based on family groupings[117]	Average number of waste contractors
Rural	4
Semi-rural	10
Semi-urban	12
Urban	14

As there are fewer waste contractors operating in the Highlands (Appendix 14) and due to the lower population there, these "small town" urban centres may see lower levels of traffic and associated pollution leading to less congestion, air quality and noise pollution. As a result the potential benefits of zoning may not be of the same scale as when considering a large urban area. This is not to say that reducing congestion, air quality and noise pollution is not worthy of attention in rural areas as well. Climate change is a global issue and all reductions in GHG emissions contribute towards the overall action toward achieving reduction targets.

Due to the low number of WMCs servicing a large geographical area, further research would be needed to assess issues being experienced by rural businesses in relation to their waste collections. Elements of zoning could potentially enable the following:

- **Businesses:** could negotiate costs, availability and consistency of services – potentially improving customer service - through collective buying power.
- **WMCs:** could review collection frequency and costs through the number of contracts guaranteed in the zone

In addition, an identified area in the Highlands where interventions around waste collection provision may offer benefits is Inverness. With a population of approximately 47,000, Inverness is the largest urban centre in the Highlands. This classifies it as an "other urban area" and not rural in the Scottish Governments Urban Rural Classification 2020. Issues mentioned by a representative of the Inverness BID included poor service quality, high pollution levels and impacts on the street scene from commercial waste bins. These are all impacts that can be targeted for improvement through zoning. However, it is also noted in this research that there are other existing interventions that could also be used to address some of these issues e.g. bin presentation restrictions.

[117] Local Government Benchmarking Framework (undated). How do we compare councils?

5 Recommendations for next steps

The main points of interest in CWZs from the Scottish Government is centred around the impact they could facilitate on improving recycling rates and reducing associated GHG emissions. The research findings suggested that zoning has the potential to impact these factors. However, the scale of this cannot be translated directly from international case studies as the context that drove the implementation of CWZs is different to Scotland.

Whilst the findings show that voluntary examples could potentially have a positive impact on recycling performance and GHG emissions, further research and modelling needs to be undertaken to fully understand the scale of impacts that voluntary and mandatory CWZs could bring. This should also include an assessment on whether either voluntary of mandatory zoning options will be more effective than using existing legislative measures such as LEZs or improving enforcement of mandated separate collections.

Recommended next steps can be summarised by three stages (Figure 6):

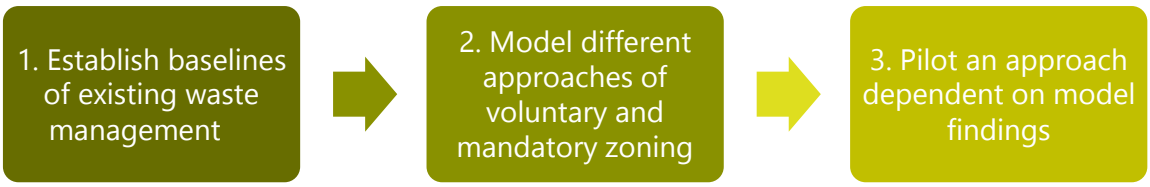

Figure 6 Recommended next steps

5.1 Establish baselines

For urban areas, establish a baseline to capture the impact the commercial waste industry is having on factors such as air pollution, number of vehicle journeys, collection costs, GHG emissions from transport, noise pollution and presentation of containers.

For rural areas, conduct research on the impact that the commercial waste industry is having on factors such as costs, consistency of service, customer service and route efficiency.

5.2 Model different approaches

Following the initial baseline review, the next step is to model the impact of introducing a form of CWZ. This would provide an opportunity to better understand the impact of voluntary and mandatory zoning on recycling rates (and other factors) in Scotland. This should, as a minimum, be carried out in an urban context. Following the outcomes from this first step, modelling these approaches in a rural setting may also be worth exploration.

New York City carried out detailed modelling during the planning stage. By using informed data and technically driven modelling, they were able to work through strong opposition from over 50

WMCs. The modelling demonstrated that zoning could reduce vehicle movements by at least 50% and could reduce GHG emissions by 42-64%. As zoning has not yet been implemented, it is not possible to comment on the accuracy of these estimates.

There were differences between the mandatory and voluntary approaches seen in the international examples. When designing these models it may be beneficial to consider areas such as data tracking, consolidation point collection models and business rate rebates. These insights could be incorporated into future thinking around the potential viability and impact of CWZs.

There is the potential to explore the feasibility and impact of innovative waste collections seen in some of the examples, such as collection consolidation points or e-cargo bikes used in the Putney BID. It would need to be explored whether it is feasible or beneficial to implement in larger urban areas.

5.3 Pilot an approach

Once the modelling stage has been conducted, and any zoning approaches identified that appear worth further investigation, a pilot scheme should be introduced. At this stage in the research, there is not sufficient evidence to suggest whether a voluntary or mandatory approach should be piloted.

Appendix 1 Cases identified in Task 1

The list is not an exhaustive list of examples but rather a list of cases identified from the desk-based evidence review research. For example, there are six examples of voluntary CWZs in Scotland, but the Essential Edinburgh BID's example was chosen as the most established, with some data available at a desktop level.

Table 11: Long list of example cases of mandatory commercial waste zoning or similar (cases highlighted in grey were used further in this research)

Mandatory cases[118]	Type of scheme	Drivers of implementation	No. of waste companies	No. of businesses	Data availability online	Zone description	Include in Task 2	Areas of interest
San Jose, USA	Legislated Waste Management Zone. Exclusive franchise agreement.	- Ensure compliance with state recycling laws - Reduce noise - Reduce air pollution - Increase landfill diversion	1	8,000	Medium	Good	Yes	- The pros and cons of using one waste contractor
Santa Clara, USA	Legislated Waste Management Zone. Exclusive franchise agreement.	- Enforce mandatory organics recycling - Reduce noise - Reduce air pollution - Reduce waste	1	Estimated 300 from map data	Low	Good	Yes	- The pros and cons of using one waste contractor
Los Angeles, USA	Legislated Waste Management Zone. Exclusive franchise agreement	- Enforce mandatory organics recycling - Improve workers' rights through employee reporting on welfare and accidents - Reduce noise - Reduce air pollution - Reduce waste	7	80,000	Medium	Good	Yes	- How the zones were established, and waste contractors were selected i.e., the bidding process - How the city council ensured fairness and transparency

[118] Cases highlighted in grey have been taken into task 2: pre and post implementation

Mandatory cases[118]	Type of scheme	Drivers of implementation	No. of waste companies	No. of businesses	Data availability online	Zone description	Include in Task 2	Areas of interest
Barcelona, Spain	Legislated Waste Management Zone. Non-exclusive franchise agreement. Businesses must hire a waste carrier chosen by the local authority.	- Improve the quality of cleaning services in the neighbourhoods, - Implement a zero-waste strategy aimed at increasing the percentage of recycling in the city - Enforce mandatory organics recycling	4	No estimate available	Low	Poor	Yes	- Example of a case in Europe - Example of a non-exclusive franchise agreement
New York, USA	Legislated Waste Management Zone. Exclusive franchise agreement	- Reduce cost to business - Reduce noise - Reduce air pollution - Reduce waste	Plan to have 20 zones with 3 waste contractors each (potentially between 3-60)	100,000+	Medium	Good	No[119]	- Process of setting up the commercial waste zoning scheme
Portland, USA	Non-exclusive franchise agreement	- Not found at desktop research level	15	Estimated over 20,000	Low	Poor	No	N/A
Oakland, USA	Non-exclusive franchise agreement	- Improve recycling rates	7	Estimated over 9,000	Low	Poor	No	N/A
Seattle commercial garbage collection, USA	Legislated Waste Management Zone. Exclusive franchise agreement	- Not found at desktop research level	2	No estimate available	Medium	Sufficient	No	N/A
Seattle Clear Alleys Programme, USA	Legislated Waste Management Scheme.	- Reduce the storage of waste containers in the public right-of-way to - Reduce illegal activities in alleys, - Increase the attractiveness of the area and allow better access for deliveries	2	No estimate available	Medium	Sufficient	No	N/A

[119] The New York Commercial Waste Zone Scheme has not yet been implemented. How the scheme has been developed will be examined in task 5.

Mandatory cases[118]	Type of scheme	Drivers of implementation	No. of waste companies	No. of businesses	Data availability online	Zone description	Include in Task 2	Areas of interest
Lee County, Florida, USA	Legislated Waste Management Zone. Exclusive franchise agreement	- Establish mandatory recycling for businesses and multi-family buildings.	3	44,000	Low	Poor	No	N/A

Table 122: Long list of example cases of voluntary commercial waste zoning or similar (cases highlighted in grey were used further in this research)

Voluntary cases[120]	Type of scheme	Drivers of implementation	No. of waste companies	No. of businesses	Data availability online	Zone description	Include in Task 2	Areas of interest
Bath BID, UK	Membership BID	- Reduce congestion - Reduce air pollution	1	Over 650	Low	Poor	Yes	The pros and cons of the BID in a small sized city comparable to Scotland
Positive Putney BID, London, UK	Membership BID	- Reduce cost to business - Improve recycling - Increase recycling provision offer within strict street access times set by council	1	No estimate available	Medium	Good	Yes	The impact of using e-cargo bikes and waste consolidation points for commercial waste collection
Norwich BID	Membership BID	- Improve recycling rates - Reduce cost to business - Reduce congestion	1	700+	Low	Sufficient	Yes	The pros and cons of the BID in a small sized city comparable to Scotland
Essential Edinburgh BID	Membership BID	- Improve recycling rates - Reduce cost to business	1	650	Low	Sufficient	Yes	The pros and cons of a waste scheme in a BID in Scotland

[120] Cases highlighted in grey have been taken into task 2: pre and post implementation

Voluntary cases[120]	Type of scheme	Drivers of implementation	No. of waste companies	No. of businesses	Data availability online	Zone description	Include in Task 2	Areas of interest
West End Waste Consolidation, London, UK	Membership BID	- Reduce cost to business - Improve recycling - Increase recycling provision offer within strict street access times set by council	1	320	Medium	Good	Yes	The pros and cons of waste consolidation scheme as opposed to a preferred supplier scheme
Baker Street Quarter, London, UK	Membership BID	- Reduce cost to business - Improve recycling - Reduce air pollution and CO2 emissions - Increase recycling provision offer within strict street access times set by council	2	200	Medium	Sufficient	Yes	The pros and cons of using two waste contractors Quantitative data available for analysis
Better Bankside	Membership BID	- Reduce cost to business - Improve recycling	1	800 (but multioccupancy buildings considered one customer reduces overall to 250	Medium	Sufficient	Yes	The pros and cons of providing free recycling for businesses
Liverpool BID, UK	Membership BID	- Provide value for money, and efficient services and advice	1	1,000	Low	Poor	No	N/A
Heart of London Business Alliance, UK	Membership BID	- Discounted quality waste and recycling services to businesses - Improve air quality - Increase recycling performance and quality - Reduce waste vehicle movements.	1	7	Medium	Good	No	N/A
Imog-Vanheede Pilot, Belgium	Waste consolidation pilot scheme	- Reduce emissions - Reduce congestion - Stimulate collaboration between waste contractors.	2	Unknown	Low	Poor	No	N/A

Appendix 2 Initial rapid SWOT

SWOT analysis of select cases.

The below list of examples of CWZ / BIDs are referred to as *cases* and listed numerically:

1. Los Angeles
2. Barcelona
3. West End London BID
4. Norwich BID
5. Bath BID
6. Essential Edinburgh BID

Figure 7. Strengths of zoning for each stakeholder group
Cases:
1. Los Angeles
2. Barcelona
3. West End London BID
4. Norwich BID
5. Bath BID
6. Essential Edinburgh BID

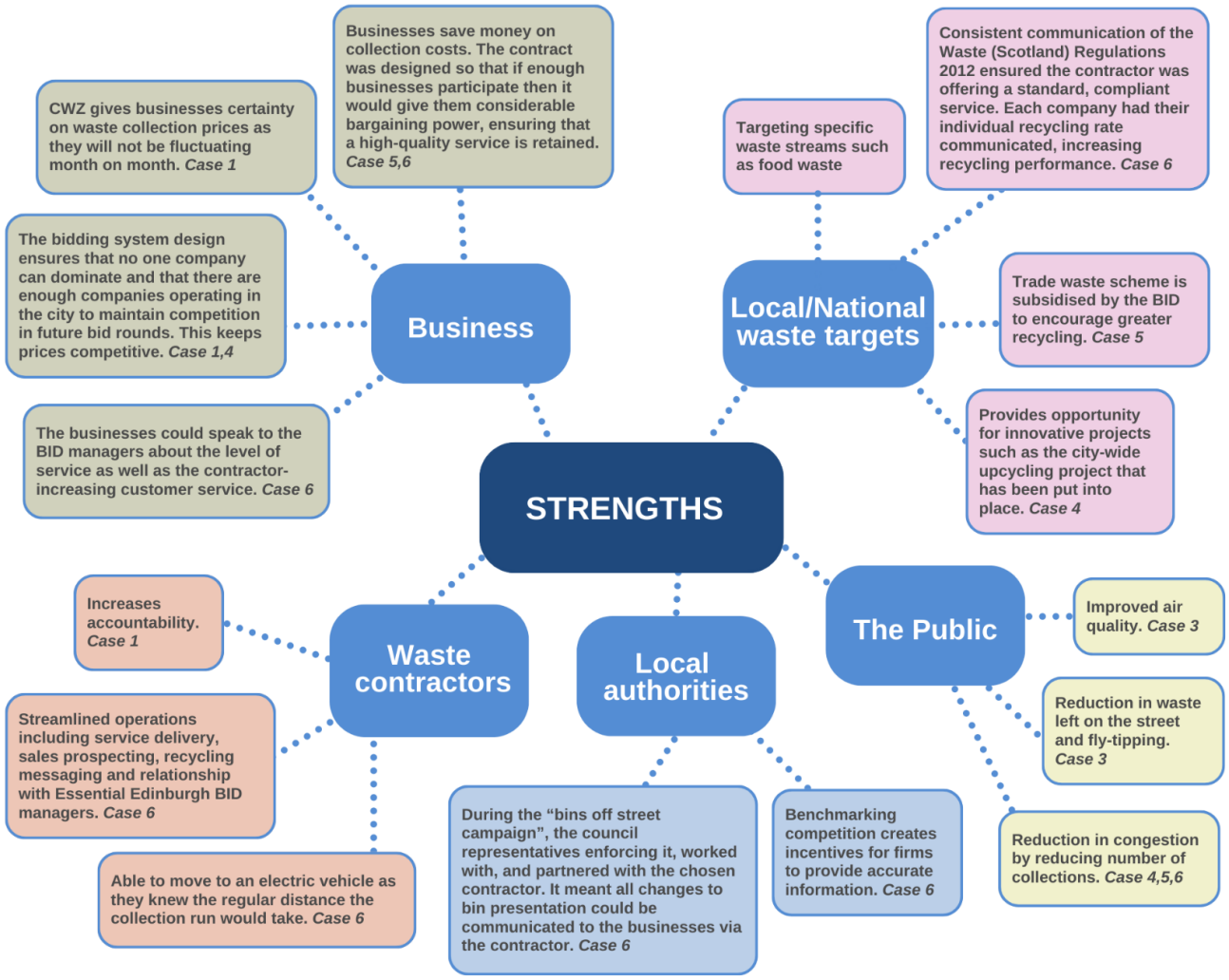

Figure 8. Weaknesses of zoning for each stakeholder group.
Cases
1. Los Angeles
2. Barcelona
3. West End London BID
4. Norwich BID
5. Bath BID
6. Essential Edinburgh BID

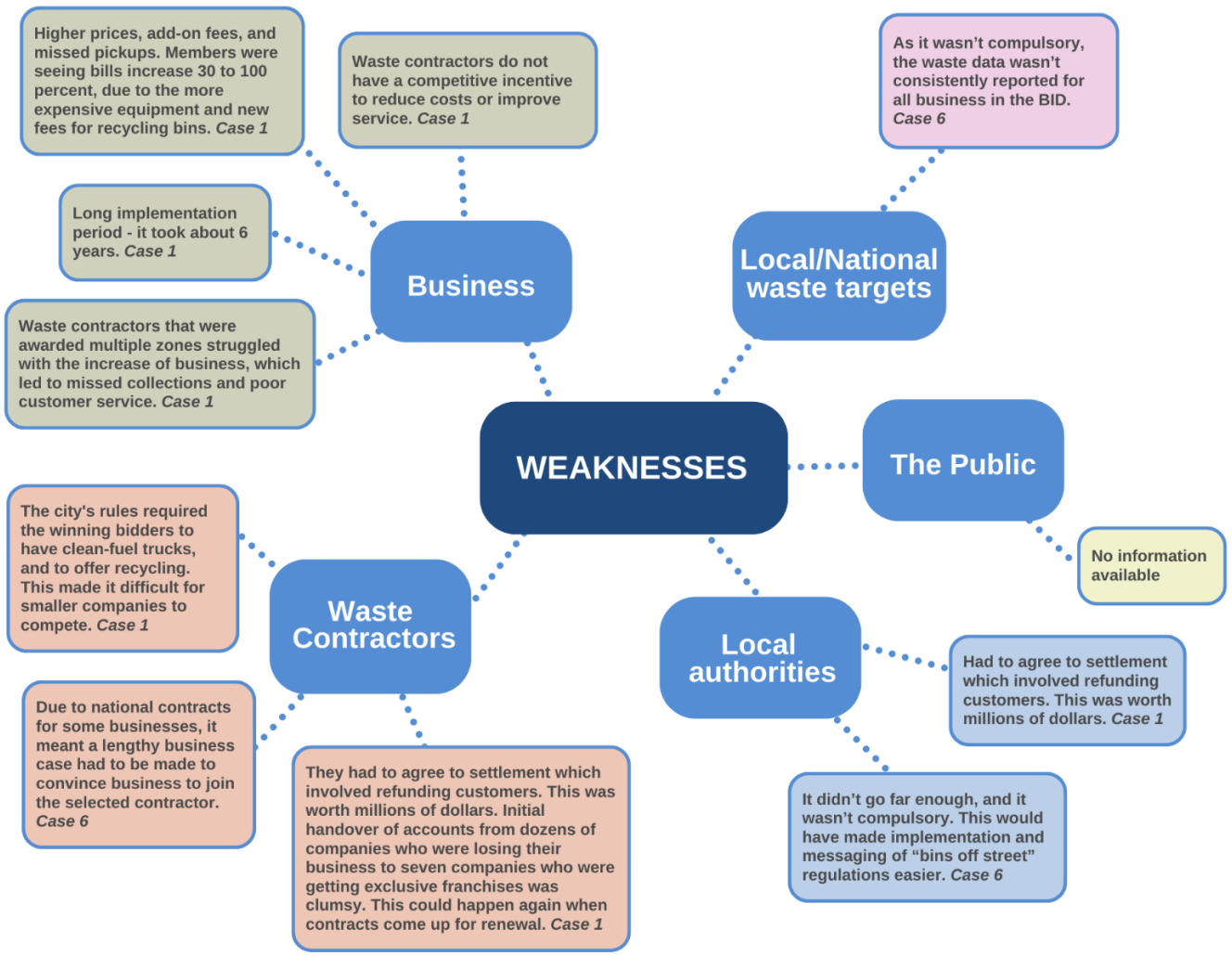

Figure 9. Opportunities of zoning for each stakeholder group. Cases:
1. Los Angeles
2. Barcelona
3. West End London BID
4. Norwich BID
5. Bath BID;
6. Essential Edinburgh BID

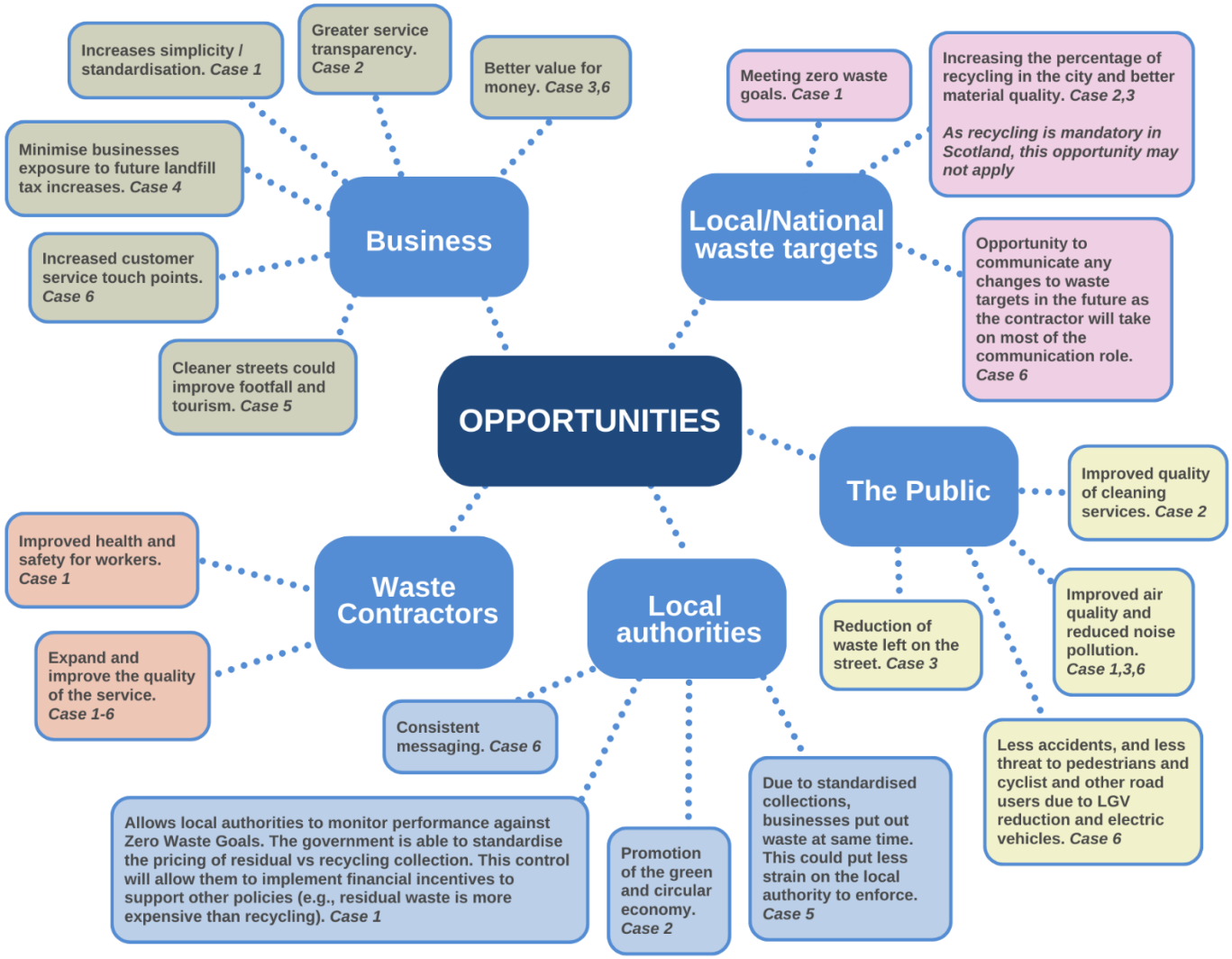

Figure 10: *Threats of* zoning *for each stakeholder group.*

Cases:

1. Los Angeles
2. Barcelona
3. West End London BID;
4. Norwich BID
5. Bath BID
6. Essential Edinburgh BID

)

Appendix 3 Stakeholder interview pro forma

Lead organisation of the commercial zone (local authority or BID manager)	
Introduction	
Can you give a background to your involvement in the (specify name of case i.e. exclusive waste franchise)?	
What was your role in the development and or implementation of the PWSS /commercial waste zoning?	
What did you understand the drivers for implementing commercial waste zoning to be? What were the issues that led to this being implemented?	
Were there clear aims? Specify the aims	
How did you plan for this? (i.e. consultation/research/stakeholder engagement). How long did it take? What was the process?	
What legislation did you use to start the process? Were there any new instruments brought forward to do this?	
What did the consultation process look like?	
How did you decide on the bidding process?	
How did you decide on the length of time the contract with the waste contractor would be in place for?	

Data recorded

Did you take a baseline of any of the driving factors before its implementation?	Baseline data taken?	Was there a change observed from the start until now?	Is there a quantifiable Impact recorded?
1. (GHG emissions (particularly CO2) from transport			
2. Air quality			
3. Noise levels			
4. CO2-eq from waste			
5. Recycling rates			
6. Costs of waste collection services for businesses			
7. Data quality on commercial recycling			
8. Service quality and consistency of service			
9. Collection timings and presentation of containers			
10. Who was responsible for collecting and reporting data? 11. What data is reported and where? 12. Could we see any data?			

Reflections	
Has the commercial zone achieved its aims? How do you know? Were they intended? Were there any unintended outcomes?	
Where have the biggest impacts been witnessed? Is there quantitative data, or other data, to support this?	
From your perspective – What has worked well and not so well for the introduction of the zoning?	
From the perspective of the businesses in the area – What has worked well and not so well for the introduction of the zoning? How do you know?	

From the perspective of the Waste management companies selected to deliver services in the zone – What has worked well and not so well for the introduction of the zoning? How do you know? 1. How many operators before the scheme introduced 2. How many now. 3. How did you consult / engage with WMCs 4. Improvements / investments Main arguments for and against from WMCs on introducing the CWZ.	
From the perspective of the local authority in the area – What has worked well and not so well for the introduction of the zoning?	
From the perspective of the public in the area – What has worked well and not so well for the introduction of the zoning?	
Where has the strongest support for the waste zone come from?	
Where has the strongest criticism for the waste zone come from?	
Summary: What were the main benefits?	
Summary: What were the main issues or challenges?	
Final thoughts: What would you have done the same and done differently?	
What does the future hold for the CWZ?	
Any final comments	

Appendix 4 Stakeholder mapping for workshops

	Commercial zoning workshop - Researching its applicability in Scotland

Purpose of the workshop	- To present what our research has showed of CWZ intended aims and its impacts.
	- In the Scottish context:
	  o Whether its applicable
	  o How
	  o Where

Stakeholders that were invited	- Waste management companies from three different variables
	  o National – Keenan recycling and Enva (Edinburgh)/Keenan recycling and Biffa (Inverness)
	  o Regional -central belt or Highlands - NWH (Edinburgh)/Bowmans (Inverness)
	  o Local only -Hamilton's and Changeworks Recycling (Edinburgh) /Munros (Inverness)
	- Local authority representative (City of Edinburgh council and Highlands council)
	- University representative (3 x Edinburgh including University of Edinburgh, Heriot Watt and Napier university, 1 x Inverness including Highlands and Island University college)
	- Business representative (Edinburgh including The Dome and the Assembly rooms)
	- Public representative (both cities: Living streets/Highland Community Waste Partnership/FOE)
	- Zero Waste Scotland representative
	- Business improvement district representative (inverness BID and Essential Edinburgh BID)

Locations	One physical workshop in Edinburgh

Appendix 5 Example aims on mandatory CWZs

Los Angeles aims of exclusive franchise agreements[121]

- Meet the City's Zero Waste Goals
- Meet state requirements for landfill reduction & mandatory recycling and organics recycling
- Improve health and safety for solid waste workers
- Improve efficiency of the City's solid waste system
- Improve the City's air quality
- Provide the highest level of customer service
- Create consistent, fair and equitable rates
- Create a system that ensures long term competition
- Ensure sufficient staffing to meet Program goals
- Ensure reliable system infrastructure

[121] Taken from document from LASAN not in the public domain

New York aims of exclusive franchise agreements[122]

Commercial waste zones will achieve a number of stakeholder-driven program goals:

Zero Waste

Reduce commercial waste disposal and incentivize recycling

Environmental Health

Reduce truck traffic throughout the city to reduce air pollution and improve quality of life for New Yorkers

Pricing

Provide fair, transparent pricing with low prices for businesses large and small

Customer Service

Strengthen customer service standards and establish accountability

Health and Safety

Improve training and safety standards to make the industry safer for workers and the public

Labor and Worker Rights

Improve industry labor standards and uphold worker rights

Infrastructure and Waste Management

Prioritize investments in clean, modern fleets and facilities that make up a reliable, resilient, and sustainable waste management system

Robust, Competitive Industry

Create a system that works for carters of all sizes and prevents overreliance on any single company

[122] https://dsny.cityofnewyork.us/wp-content/uploads/2018/11/CWZ_Plan-1.pdf

Appendix 6 Modelled estimated air quality and GHG emissions impact

Los Angeles

Based on the average distance travelled and number of diesel refuse trucks per year in Los Angeles, Resource Futures were able to estimate the potential savings in NOx and PM2.5 emissions (see Table 13 below).

Table 13: NOx and PM2.5 emissions potential from 545 diesel vehicles

Description	Amount	Unit
Average transportation distance of a truck	14,500[123]	miles/year
Average transportation distance from 545 vehicles	7,902,500	miles/year
NOx emission from heavy-duty trucks	3.518[124]	g/mile
NOx emissions from 545 vehicles	27,801	kg/year
PM2.5 emissions from heavy-duty trucks	0.076	g/mile
PM2.5 emissions from 545 vehicles	601	kg/year

Compared to diesel and even to petrol, CNG creates far less nitrogen oxides (NOx) and particulate matter (PM) when combusted. This data was used to estimate NOx and PM emissions from 545 comparable CNG refuse trucks in Los Angeles (7.9 million miles/year). The results indicate that the use of CNG trucks could contribute to the reduction of 27,801 kg NOx and 601kg of PM annually compared to diesel-powered trucks (Table 14). The proportion of total NOx and PM2.5 emissions in the area is not known.

Table 14: NOx and PM2.5 avoidance potential by CNG trucks

Vehicle	Unit	NOx	PM
Diesel vehicles	kg/year	27,801	601
CNG vehicles	kg/year	3,892	150
Emissions Savings by CNG trucks	kg/year	23,909	451

[123] US Department of Energy (2014). Case Study-Compressed Natural Gas Refuse Vehicles
[124] BTS (2022). Estimated U.S. Average Vehicle Emissions Rates per Vehicle-by-Vehicle Type Using Gasoline and Diesel

Putney

After being operational for six months, the scheme prevented 290 RCV[125] collections[126] each month (equating to the number of collections made by the RCV on Putney High Street, and not the number of times the RCV drove on the street).

The decrease of carbon has not been measured or estimated by Putney BID. The Resource Futures' carbon expert performed a high level GHG quantification of the potential carbon emissions resulting from 290 avoided RCV collections. This calculation used the length of Putney High Street and the number of vehicles being displaced by the bike: in this case, one. The approximate transportation distance of the RCV (diesel) is 1,256m (length of high street and returning distance to the consolidation point), travelled seven times per week. It was assumed that there were no emissions related to idling time as the vehicle's engine is stopped while collecting the recyclables from customers. UK Government GHG Conversion Factors for Company Reporting on the freighting of goods was used in this estimation (0.578 kg CO_2eq[127]/tonne/km). The estimated carbon avoided from the RCV collections amounts through implementation of the 'Putney Pedals' scheme is 291kg CO_2eq/year (see Table 15).

Table 15: Carbon avoidance potential by preventing using e-cargo bike instead of RCV

Description	Amount	Unit
Total distance travel	8792	m/week
Total distance travel	8.792	km/week
The average emission factor of (up to 3.5 tonnes)- Diesel van	0.579	kg CO_2eq/tonne.km
Total tonne.km per week	9.761	tonne.km
Carbon emissions per week	5.597	kg CO_2eq /week
Carbon emissions per year	291.035	kg CO_2eq /year

[125] ReLondon (Undated). Case Study- Putney Pedals ramps up recycling on busiest high street in London
[126] Defined as a collection of a single waste stream from a single business premises
[127] Greenhouse gas reporting: conversion factors 2022

Appendix 7 Case study: Recorra

"Where a collaborative relationship is set up with a BID we have seen an increase in client acquisition leading to greater route density and some sales efficiencies, within the BID area, for sack collection services from smaller clients where cage vehicles are typically used. It was also important that collections could take place in areas directly adjacent to the BID territory to enable the efficient use of vehicles where demand in the BID area on individual collection rounds was not sufficient to fill vehicles. Collections limited to the BID areas alone would not necessarily have given any efficiencies on an overall operational basis" - Director At Recorra

After being selected as the preferred waste supplier for several London BID areas, these strong partnerships made Recorra anecdotally feel that small improvements had occurred in its operations within these BID area relating to sack collection services (sack collections are typically the most common type of collection by customer number in BID areas serviced by the company). Improvements were made in areas including:

- route efficiency
- route density
- streamlining of sales activity
- productivity of staff

The density of collections for wheeled bin services or larger containers was not significantly impacted. In Recorra's view a key aspect of the BID schemes was that participation was voluntary. This meant that those who participated were generally smaller companies where joint procurement made the most financial difference. It was also important that collections could take place in areas directly adjacent to the BID territory to enable the efficient use of vehicles where demand in the BID area on individual collection rounds was not sufficient to fill vehicles. The company felt that collections limited to the BID areas alone would not necessarily have given any efficiencies on an overall operational basis.

Appendix 8 New York City process to introduce CWZ regulations

This section outlines the process that DSNY has taken to introduce zoning in New York City. This process took many years of planning and illustrates an example of the step-by-step process required to design and develop zoning regulations. Regulation covering some of the below example areas includes:

- Number of contractors per number of customer
- Their route
- Their vehicle type/age and associated emissions
- The number of journeys through areas of low income
- The number of transfer stations
- Cost to SMEs
- Market dominance

Following several years of study and consultation around establishing a CWZ, between 2006-2018, the steps outlined below were taken to be able to set up commercial zoning in New York City once the legislation was passed.

1. Divide city into zones

New York City was divided into 20 Zones using existing community district boundaries. Although the zones vary in size and geographic area, they each have a similar number of customers operating within their boundaries.

2. Stakeholder engagement

This process is ongoing throughout the CWZ implementation. Feedback from these stakeholder engagement sessions will inform components of the commercial zoning programme going forward.

3. Environmental review

An environmental review for the commercial waste zone was undertaken shortly after the release of the waste commercial zoning plan. A formal environmental review under the *City Environmental Quality Review* and *State Environmental Quality Review Act* followed this initial environmental review. Impacts which were evaluated included environmental impacts, cultural resources, economic resources, social impacts, public health and safety and transportation and traffic.

4. Competitive solicitation

In 2019, New York City opened the waste zones for competitive tender to qualified waste collectors. New York Cities' request for proposals (RFP) included specific details on goals and methods for implementation for the commercial waste zones.

5. RFP evaluation and contract execution

Waste collectors were given a specific time limit to prepare and return their proposals. These proposals will be evaluated against the criteria set out in the RFP. Pricing will account for 40% of the overall score, the rest of the evaluation will be based on consistency with the overall goals of the RFP. Contracts can be awarded to between three and five waste collectors per zone and individual waste collectors can be awarded up to 15 zones.

6. Customer transition

New York City anticipates that the transition period will last two years to accommodate all customer needs. Once the transition period has started, waste collectors will be prevented from entering new contracts that extend beyond the commercial waste zone transition deadline. New York City will notify all businesses and customers as to which waste collectors were selected for their zone. Customers can only make new service agreements with the selected waste collectors for their zone once the transition period begins. New York City will assign waste collectors to customers who fail to select a waste collector themselves.

Appendix 9 Detail on operational requirements of mandatory zoning cases

New York

Law LL199 of 2019 required the local authority to establish commercial waste zones throughout New York City. The local law amends the New York city charter section 753 and administrative code section 16-1020 to introduce a commercial waste zone system.

Commissioners are granted the powers and "duty to regulate the conduct of businesses authorized to collect commercial waste in commercial waste zones pursuant to title 16-B of the administrative code and any other applicable law, including but not limited to, the power and duty to establish and enforce":[128]

(a) **Environmental, safety and health standards:** Waste contractors must create a health and safety plan and conduct health and safety training.

(b) **Standards for service:** Waste contractor must submit a customer service plan, enter into written service agreements with customers, and provide consolidated monthly bill to all customers. The waste contractor cannot refuse service to any customer in their zone.

(c) **Requirements regarding contracts for commercial waste removal:** Waste contractors must have contingency plans/plans for changes in ownership. This includes creating a customer outreach plan to inform current customers about new requirements and engage with potential new customers in their zone(s).

(d) **Requirements regarding billing forms and procedures:** The city is responsible for establishing maximum pricing rates. Waste contractors must provide lower rates for organics and recycling than for residual waste and be transparent around extra service fees or supplementary charges.

(e) **Requirements regarding the maintenance and inspection of records:** Waste contractors must maintain records and make them available to the local authority upon request. These records include financial records, customer complaint records, vehicle maintenance and inspection records, and health and safety planning.

(f) **Requirements regarding the maintenance of appropriate insurance;** and

(g) **Requirements established in furtherance of the goals of reducing waste and promoting sustainability, safety and efficiency in the commercial waste zone system:** Waste contractors must submit zero waste plans stating their proposed plans to reduce waste sent to landfill and increase recycling and organics diversion. Waste contractors must also provide all customers with an organics and recycling collection and demonstrate they are complying with all waste laws.

[128] https://youtu.be/RXunP69o9x8

Los Angeles

Section 66.33 of the Los Angeles Municipal Code enabled the Los Angeles City Council to "award contracts for collection services for commercial establishments and multifamily dwellings through an exclusive franchise agreement authorizing and obligating the holder to provide collection services within a franchise zone".[129] The municipal code sets out that there must be 11 zones, and sets minimum standards that must apply to all waste contractors:

- **Required collection services:** The contractor must collect, transport and deliver for processing or disposal all solid waste generated at all commercial establishments and multi-family dwellings located within their zone.
- **Clean fuel vehicles:** The vehicles used by the waste contractors must at all times be in compliance with all air pollution controls and regulations.
- **Labour peace agreement**
- **Processing and disposal:** The waste contractor must deliver all recyclables and organics collected from commercial establishments and multi-family dwellings exclusively to facilities certified by the city.
- **Diversion:** The waste contractor must provide every customer within its franchise zone a container specifically designated for the collection of recyclables and organics. Waste contractors must also meet specific landfill disposal reduction requirements.
- **Compliance with living wage and responsible contractor requirements:** Waste contractors must comply with all requirements of an "Employer" under the City's Living Wage Ordinance
- **Whistle-blower protection-** The waste contractor must not retaliate against an employee who has made a protest or raised a complaint on the basis of a reasonable belief the practice is in violation of the municipal code or other applicable laws.

San Jose

Part 11 of the San Jose municipal code states that collecting, transporting and disposing of commercial solid waste, organic material and recyclable should be regulated by the city. Provisions in Article XIII of the City Charter gave San Jose City Council the power to establish a franchise agreement, not specifying commercial waste.[130] The municipal code states that they will not grant

[129] https://codelibrary.amlegal.com/codes/los_angeles/latest/lamc/0-0-0-285079
[130] https://www.sanjoseca.gov/home/showpublisheddocument/13907/637532449706900000

any franchise if it is not for the public good and that all franchises shall be subject to the terms and conditions specified in the Charter of the City of San Jose.[131]

The municipal code sets out:[132]

- **Restrictions on customer contracts:** Cancellation periods.
- **Franchise categories:** The city council, at its discretion, can grant a commercial solid waste and recyclable materials collection franchise which is limited to solid waste, recyclable materials and organics
- **The application process for the franchise**
- **The public hearing process for evaluating the waste contractor's application**
- **The criteria for granting a franchise**
- **Requirements for franchise and its effectiveness:** The city council can determine where the waste contractor transports waste and states that the waste contractor must comply with the education, equipment, signage, container labelling, container colour, contamination monitoring and reporting.
- **The terms of the franchise**
- **Terms for the termination or suspension of the franchise**
- **The maximum commercial solid waste, organic materials, and recyclable material collection service rate**
- **Franchise transfer or assignment**
- **Franchise fees**
- **Reporting requirements**
- **Noise level restrictions**
- **City inspection authority**
- **The rights reserved to the city**

131 https://library.municode.com/ca/san_jose/codes/code_of_ordinances?nodeId=TIT9HESA_CH9.10SOWAMA_PT11COSOWAORMARECOFR

132 https://library.municode.com/ca/san_jose/codes/code_of_ordinances?nodeId=TIT9HESA_CH9.10SOWAMA_PT11COSOWAORMARECOFR

Appendix 10 Example contract clauses from two mandatory cases

Example 1 of the conditions for service performance of the successful WMC of the Zone. If any of the failures occurred, they would receive liquidated damages

1. Failure to comply with the provisions of the plans;
2. Failure to meet timeline milestones;
3. Failure to keep collected materials separated prior to weighing;
4. Failure to process recyclable material delivered to the recyclable material processing facility;
5. Failure to deliver any collected material to the designated disposal facility, transfer facility, recyclable processing facility, or organics processing facility;
6. Failure to provide adequate primary and alternate capacity to process recyclable material;
7. Failure to provide CITY access to real-time, read-only customer information system;
8. Failure to maintain customer service during office hours;
9. Failure to meet the first two call centre metrics (measured on a monthly average basis);
10. Failure to achieve minimum acceptable score for call centre service level quality;
11. Failure or neglect to reasonably resolve any complaint within the requisite time;
12. Failure to clean up spillage or litter during the course of the franchisee's collection operation;
13. Failure to remove graffiti from any container;
14. Failure to equip collection vehicles with GPS or similar technology that allows for confirmation of vehicles whereabouts by time and date;
15. Failure to properly cover material in collection vehicles;
16. Failure to display the franchisee's name and customer service phone number on collection vehicles;
17. Failure of franchisee's field personnel to carry photographic identification or wear uniform shirts;
18. Failure to maintain or timely submit to the city all documents and reports;
19. Failure to submit report corrections within the city's approved timeframe;
20. Failure to deliver all wet material to the organic processing facility prior to exceeding daily maximum limit;
21. Failure to meet minimum diversion standards as measured on a facility-wide basis as reported to the Department of Resources Recycling and Recovery (CalRecycle); and
22. Failure of the franchisee to pay the compensation due to the organic processing contractor consistent with the terms of the agreement.

Example 2 of the criteria for service performance of the successful WMC of the Zone

1. Failure to comply with the provisions of the contract;
2. Failure to meet transition timeline milestones;

3. Failure to maintain customer service during office hours;
4. Failure to maintain call centre or telephone system performance;
5. Failure or neglect to reasonably resolve any complaint within the requisite time;
6. Failure to clean up spillage or litter during the course of franchisee's Collection operation;
7. Failure to remove graffiti from any Container;
8. Failure to properly cover material in Collection vehicles;
9. Failure to maintain or timely submit to CITY all documents and reports;
10. Failure to submit report corrections within CITY-approved timeframe;
11. Failure to meet Annual Diversion Requirement.

"If the Contractor's record of performance shows that the Contractor has frequently, regularly, or repetitively defaulted in the performance of any of the covenants, conditions, or requirements contained in this Agreement, and regardless of whether the Contractor has corrected each individual condition of default or paid liquidated damages, the Contractor shall be deemed a "habitual violator" and shall forfeit the right to any further notice or grace period to correct, and all of the prior defaults shall be considered cumulative and collectively shall constitute a condition of irredeemable default. Under such circumstances, the Board shall issue the Contractor a final warning, citing the grounds therefore, and any single default by Contractor of whatever nature, subsequent to the issuance of the Board's notice, shall be grounds for immediate termination of this Agreement. In the event of any such subsequent default, the County may terminate this Agreement upon giving written notice to the Contractor, and termination shall be effective three (3) Days after the notice is delivered. All fees due to the Contractor hereunder, plus any and all charges and interest, shall be payable to the date of termination, and the Contractor shall have no further rights hereunder. Immediately upon receipt of the Board's final notice, the Contractor shall cease any further performance under this Agreement."[133]

[133] LASAN (2013) *Final Implementation Plan for Exclusive Commercial and Multifamily Franchise Hauling System*

Appendix 11 Photos from workshop

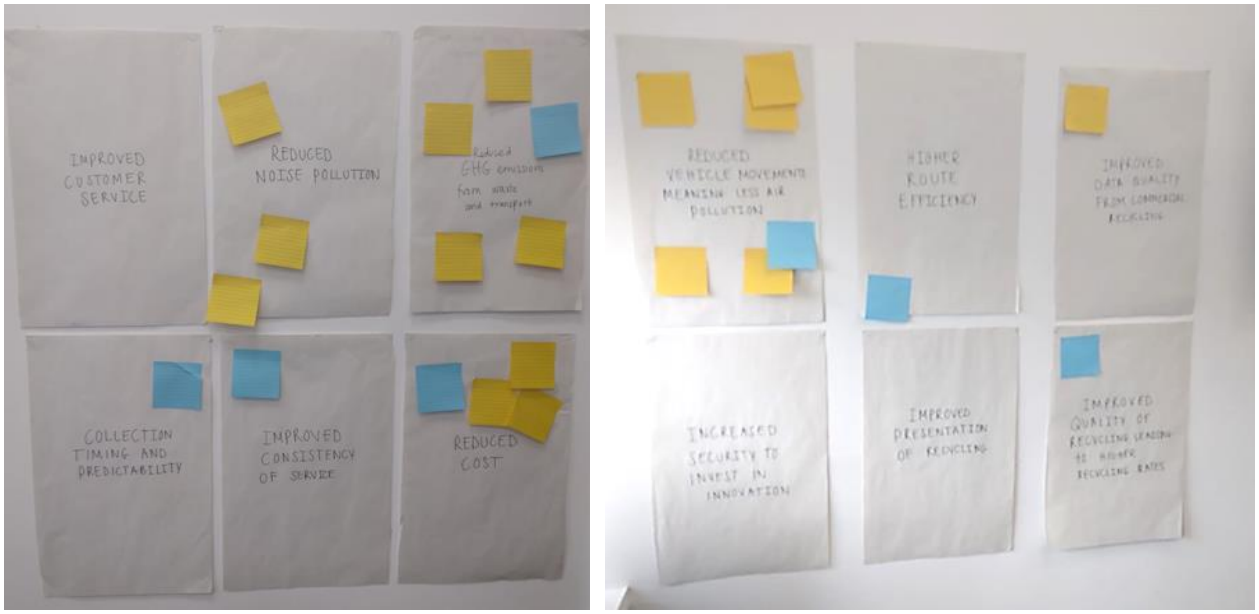

Figure 11. Activity 1 results: Where participants thought CWZ would have impact: Vote by post-it

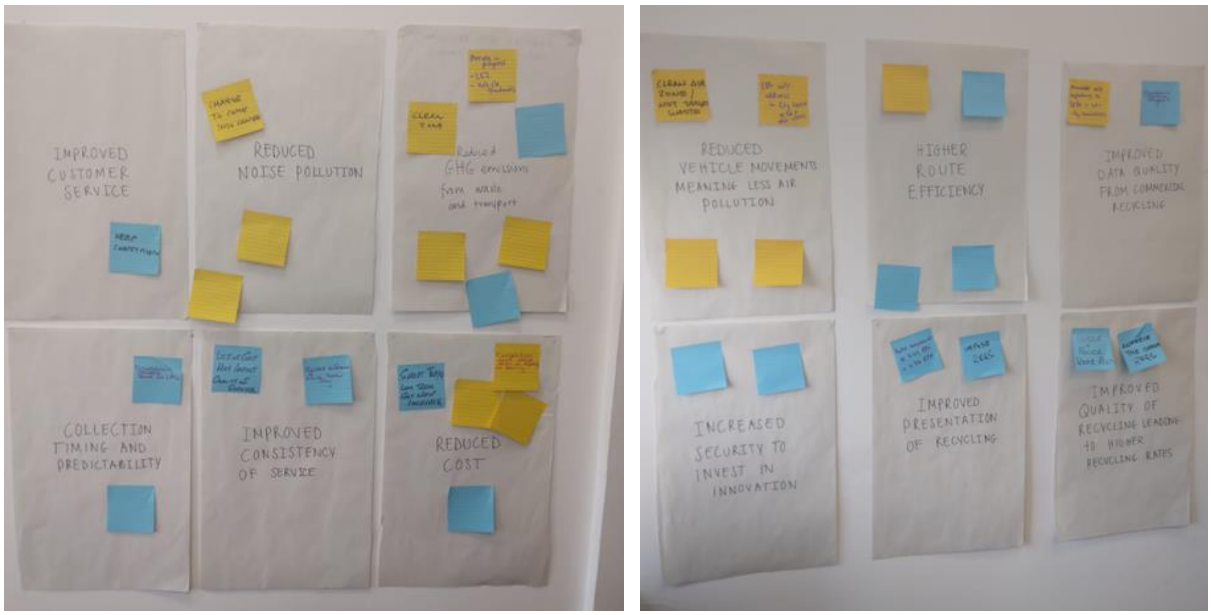

Figure 12. Activity 2 results: Listing solutions to the drivers of CWZ

Appendix 12 Intended impacts and whether new or existing legislation used

Many of the drivers for the legislation can arguably have already been instigated in Scotland by the introduction of the Waste Regulations, which for example, mandate for food waste recycling by businesses and have done so since 2013. Relevant Scottish regulation examples

Table 16: Regulations used to commence mandatory CWZ in the international examples

Mandatory example and Regulation	Key regulation driver	New legislation enacted?	Existing legislation used?	Does Scotland have existing legislation that meets or exceeds the drivers mentioned in the mandatory example?
California – Los Angeles & San Jose AB 939	Divert 50% of solid waste from landfill by 1 January 2000	Yes	Yes	No, existing legislation in Scotland that addresses this driver of regulation
California – Los Angeles & San Jose AB 341	Mandatory commercial recycling in California as well as a goal to divert 75% of solid waste away from landfill by 2020	No	Yes	No existing legislation in Scotland that addresses this driver of regulation
California – Los Angeles & San Jose AB 32	Multi-year programme to reduce greenhouse gas emissions in California to 1990 levels by 2020	No	Yes	Climate Change (Emissions Reduction Targets) (Scotland) Act 2019
California – Los Angeles & San Jose AB 1826	Requires businesses that generate a certain amount of organic waste to arrange an organics collection.	No	Yes	Yes, by the Waste (Scotland) Regulations 2012
New York City LL199 of 2019	Requires New York to establish commercial waste zones throughout New York City.	Yes	No	No
Barcelona Decree No. 1/2009	Businesses in Barcelona are required to separate their waste correctly and use the types of collection established in each area of Barcelona. Mandatory organics recycling by all sizes of waste producers	Yes	No	Yes, by the Waste (Scotland) Regulations 2012

As can be seen from Table 16 in all examples, Scotland already has regulations in the majority of areas, to address these aims.

Appendix 13 New York City route density mapping

Figure 8 shows the density of VMT of the routes from the Existing Conditions Analysis. There are heavy concentrations of VMT (and therefore trash trucks) in all of Manhattan and the Bronx, along the Gowanus, Brooklyn-Queens, and Long Island expressways, and in parts of South Brooklyn and central Queens.

Figure 8: VMT density of Existing Routes

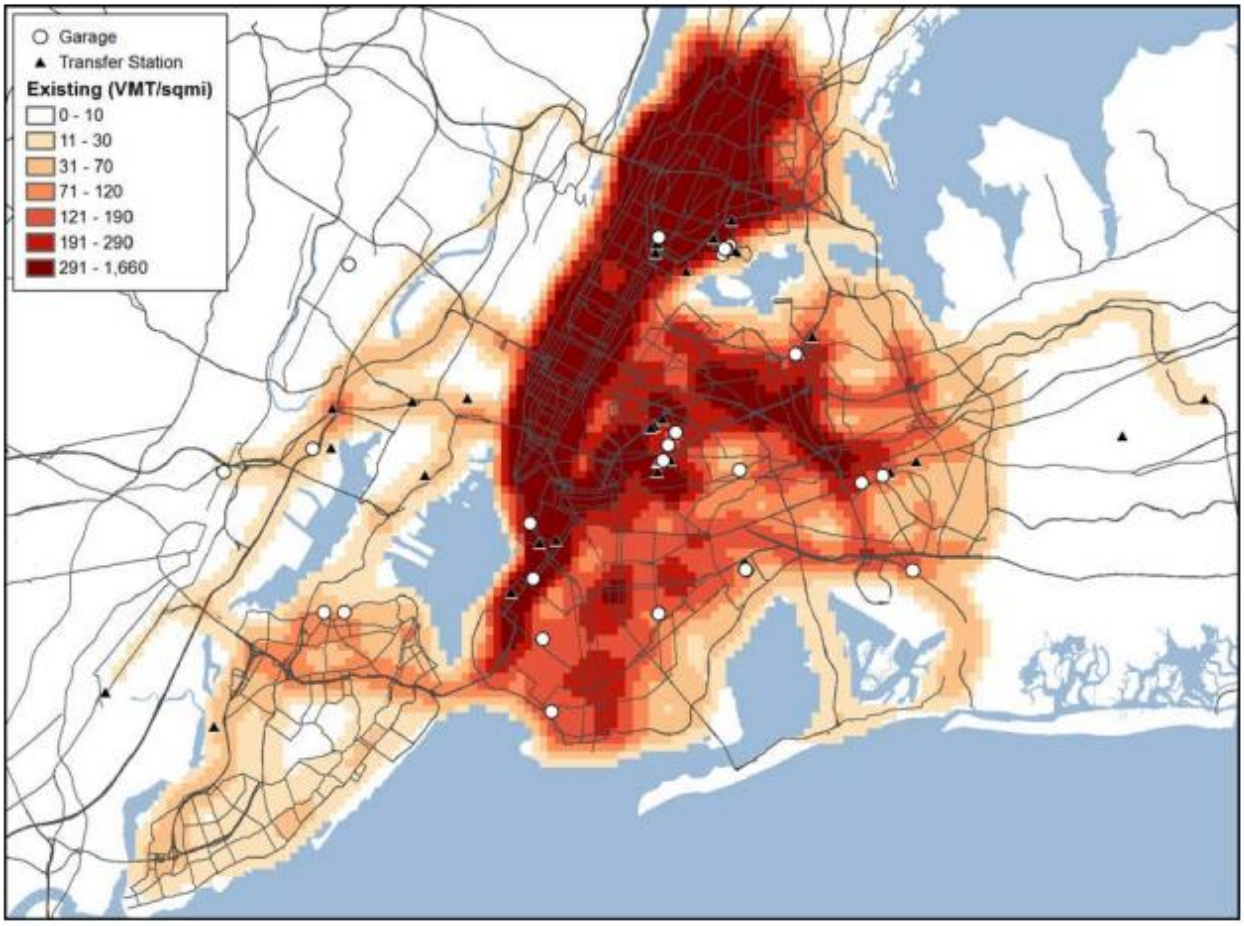

Figure 13. Map demonstrating the current vehicle miles travelled (VMT) being done by commercial RCV collections[134]

[134] https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Routing_Analysis.pdf

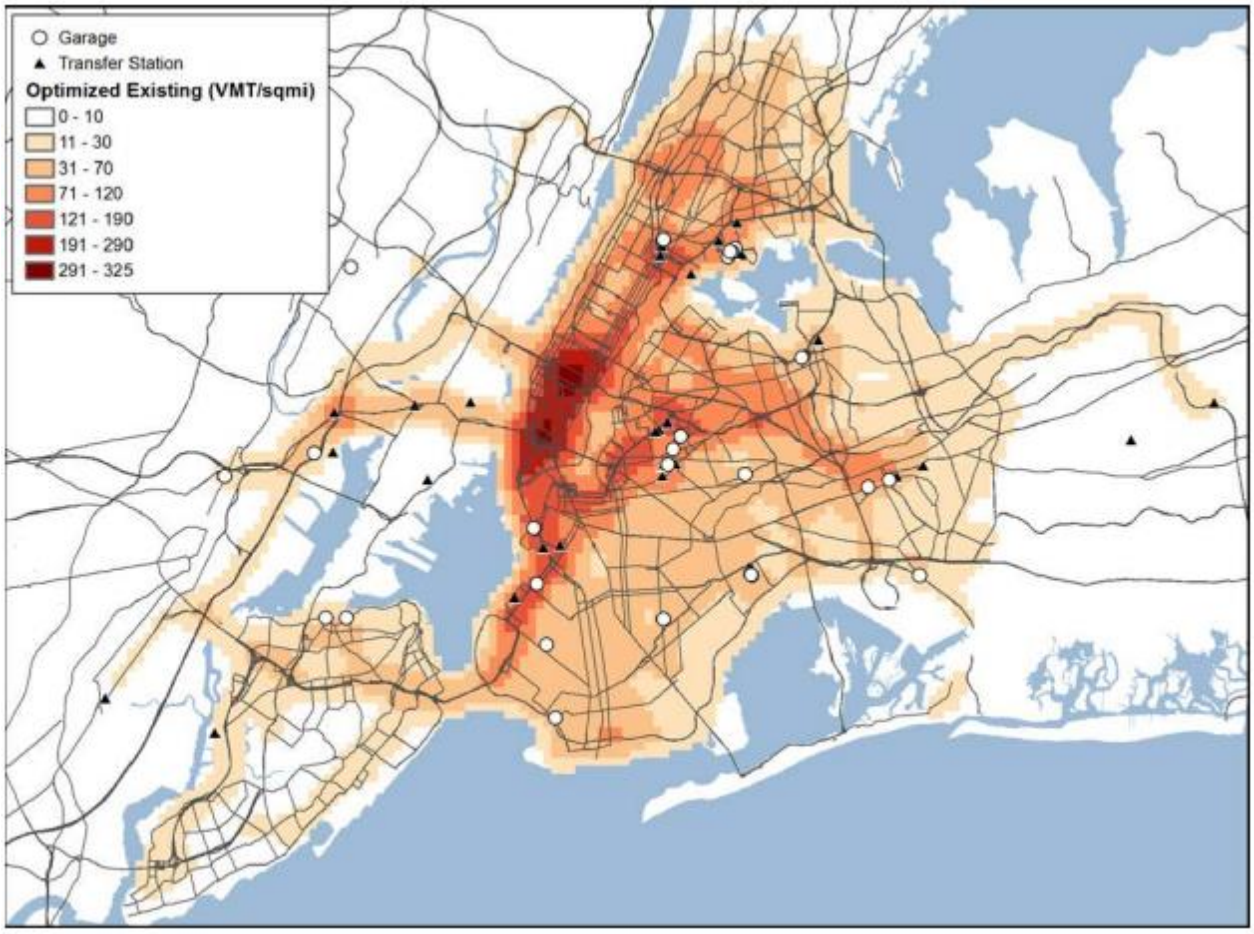

Figure 14. Map demonstrating the predicted optimized vehicle miles travelled (VMT) once commercial waste zoning has been introduced.[135]

[135] https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/Private_Carting_Study-Routing_Analysis.pdf

Appendix 14 Waste contractors by local authority

Table 17 Number of private waste contractors per local authority in Scotland

Local authority	Area type[136]	Number of private waste contractors
Aberdeen City Council	Urban	9
Aberdeenshire Council	Rural	9
Angus Council	Semi-urban	8
Argyll and Bute Council	Rural	4
City of Edinburgh Council	Urban	22
Clackmannanshire Council	Semi-urban	7
Comhairle nan Eilean Siar	Rural	0
Dumfries and Galloway Council	Rural	5
Dundee City Council	Urban	9
East Ayrshire Council	Semi-rural	8
East Dunbartonshire Council	Urban	13
East Lothian Council	Semi-rural	16
East Renfrewshire Council	Semi-urban	15
Falkirk Council	Urban	11
Fife Council	Semi-rural	12
Glasgow City Council	Urban	20
Inverclyde Council	Semi-urban	10
Midlothian Council	Semi-urban	17
North Ayrshire Council	Semi-rural	11
North Lanarkshire Council	Urban	12
Orkney Islands Council	Rural	0
Perth and Kinross Council	Semi-rural	8
Renfrewshire Council	Semi-urban	13
Scottish Borders Council	Rural	3
Shetland Islands Council	Rural	0
South Ayrshire Council	Rural	7

[136] Classified according to Local Government Benchmarking Framework Family Groupings for Environmental Indicators. Family Group 1 = rural, Group 2 = Semi-rural, Group 3 = semi-urban, group 4 = urban

South Lanarkshire Council	Semi-urban	14
Stirling Council	Semi-rural	8
The Highland Council	Semi-rural	9
The Moray Council	Rural	7
West Dunbartonshire Council	Urban	15
West Lothian Council	Semi-urban	15