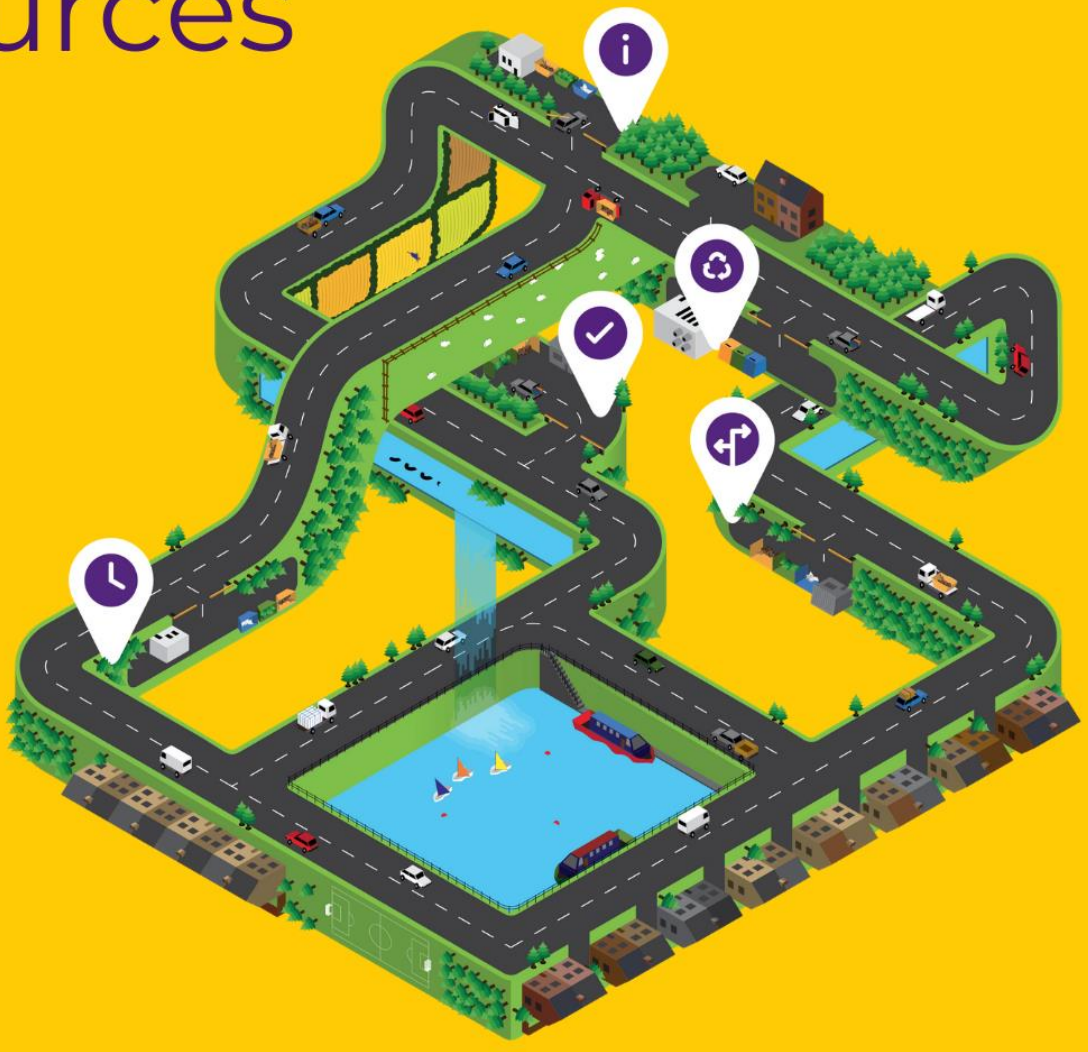
Creating open data infrastructure to turn rubbish into resources



Your Dsposal

March 2021

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About

This report was produced as part of a project funded by the Open Data Institute (ODI). We were one of seven organisations awarded funding from The Open Data Institute Stimulus Fund via their Innovate UK funded R&D programme. The Stimulus Fund aimed to explore approaches that enable trustworthy and ethical sharing of data to help citizens and businesses lower their impact on the environment, improve public services, and save lives.

This report has been researched and produced by Your Dsposal and Open Data Manchester, and published in March 2021. Its lead authors were Sophie Walker, Tom Passmore and Jamie Whyte. It builds on work carried out by Dsposal and Open Data Manchester as part of the Defra GovTech Catalyst Smart Waste Tracking project Phase I in 2018 and 2019. The views in this report are those of the authors.

If you want to share feedback by email or would like to get in touch, contact Sophie Walker at sophie@yourdsposal.uk.

Your Dsposal, a not-for-profit social enterprise wholly owned by Dsposal Ltd, was founded as a response to the lack of open data infrastructure in the UK waste industry. It seeks to address this challenge by working with stakeholders from across the public, private and third sectors to develop the necessary foundations to enable a thriving open data ecosystem to emerge. Open waste data can empower people to make better decisions with their resources and waste to make a positive impact on our environment by increasing transparency and accountability.

Open Data Manchester CIC is a not-for-profit, formed from a diverse group of open data advocates in 2010. It supports organisations to release data and helps people to use it. Through our commissioned or self-initiated programmes, we build and support good data practice, through expert advice, focused advocacy, participatory events, state-of-the-art research, technical support and tailored training. The profits from our commercial services go into the community, where we offer events and resources designed to help more people use data more effectively and ensure the sustainability of our work. Our clients are as diverse as our projects from local charities and community groups to international organisations, such as the International Finance Corporation.

Your Dsposal

Open Data Manchester

Funded and supported by

Executive Summary

Open data creates opportunities to turn rubbish into resources

This report is the result of work carried out over 8 months including desk research, an initial series of six stakeholder workshops in August and September 2020, a further set of three workshops in January 2021 and technical work to develop an open data standard on Household Waste Recycling Centres (HWRCs).

This report provides details of how we approached developing this open data standard with stakeholders which we hope is of use to others looking to develop open data standards. We also cover our key learnings and our plans for the next stages of this standard and dataset.

The authors are strong advocates of the need for open data standards for the waste industry and this project builds on previous work to develop a prototype open data standard for waste movements.

The waste industry is waking up to how useful and valuable data can be, but as a sector is still digitally immature and lacking in open data infrastructure to truly realise the potential of waste data. We hope this can be an important first step in establishing an open data institution that can develop the necessary assets to enable waste data to become the valuable resource it should be. Better waste data can lead to improved resource efficiency which in turn can help reduce our impact on the environment and meet our carbon budgets.

We acknowledge that there is much interesting work being undertaken around the world to actively address the challenges of the climate emergency and specifically on improving and opening up environmental data. These are complex, systemic challenges and will not be solved with a single initiative or by any individual actor. It is vital that we find ways to better enable collaboration. Open data and open data standards, while by no means a panacea, provide a foundation on which to build upon.

Furthermore, the opportunities and innovation that can be unlocked through the development of this open data infrastructure should not be underestimated. Global technology institutions including Open Street Map (OSM), Wikidata and Microsoft have already expressed interest in using this data to provide services to the public, and initiatives like Open Banking provide ample examples of how open data can spur innovation and create new products and services.

Background

Defra have highlighted that the lack of digital systems in the waste industry makes it easy for serious and organised crime to take advantage and so, as part of the Resources and Waste Strategy, have embarked on a project to implement digital waste tracking for all waste transactions in the UK via a GovTech Catalyst Project. The industry's current digital systems and data infrastructure are siloed, patchy and inchoate, as are much of the regulators' systems and infrastructure. Developing open data standards that enable interoperability will facilitate and smooth the transition to digital ways of working that have the potential to transform the way we value the materials that flow through our economy as waste, make it harder for criminals to take advantage and provide a level of transparency and accountability which is currently missing.

According to Defra's most recently released figures (in March 2020), recycling rates for the UK fell to 45% for the year 2018 (the most up to date figures available) and it is almost a given that we will miss our recycling targets for 2020 (50%). At the start of the first lockdown in England in March 2020, Household Waste Recycling Centres (HWRCs) closed due to not being regarded as essential activities. Certain areas subsequently reported increases in fly-tipping and with millions of us working from home the composition and quantity of waste generated in home settings has drastically increased putting huge pressures on kerbside collection services. When the government instructed councils a few weeks later to reopen their HWRCs for 'essential trips' councils adopted a range of methods to maintain social distancing and ensure the safety of workers and the public.

Your Dsposal maintains and operates one of the largest publicly available waste thesauri (linking over 20,000 key words to the 842 European Waste Catalogue (EWC) codes) and uses Environment Agency open data to join these entries to the Public Register of Regulated Premises in England in an accessible directory. This directory, which has 'profiles' for 656 HWRCs in England, provides basic information on these facilities. Our HWRC pages saw a 626% increase in page views comparing the 4 weeks prior to lockdown and the first 4 weeks in May 2020 (17,000 views) after councils reopened their HWRCs.

Though councils update their websites with information on HWRCs and other waste and recycling information the lack of consistency in where and how this information is presented has left the public searching for information, even more so during the pandemic.

WRAP (the Waste and Resources Action Programme) promote clear messaging and communications as vital to improving recycling rates and increasing public engagement in recycling programmes, yet a survey conducted in 2019 by Edelman Intelligence on behalf of Viridor found that only 46% of respondents believed they were provided with enough information to know how and what to recycle and three quarters of respondents were frustrated by the lack of educational materials on recycling. Only one in three respondents felt very confident that they were putting things in the right bin.

This project aimed to develop data infrastructure that would make it easier for the public to find useful, accurate information about their local recycling facilities by:

- Mapping the data sources and finding commonality to create a prototype open data standard
- Using best practice, unique IDs, and researched taxonomy to build upon other standards
- Releasing a prototype open dataset of this data

Approach

The project was broken down into overlapping areas of focus outlined below. We knew it was vital that from the start we engaged with as many stakeholders as possible and worked in an open way.

Research

- Create an ecosystem map of stakeholders
- Invite a wide range of stakeholders to take part in the open data standard development
- Establish a commonality in the information provided by Local Authorities about their Household Waste Recycling Centres (HWRCs)
- Identify information gaps and clarify additional data needs from stakeholders
- Determine an appropriate data structure for this information
- Ascertain how to map this data to frequently used shared vocabularies within other schemas (i.e. w3.org, schema.org, Human Services Data Specification (HSDS))
- Explore the potential to create tooling around the open data standard

Gather

- Share research outputs with stakeholders for feedback and amends
- Locate and analyse information about HWRCs published by Local Authorities and other organisations, such as WRAP and the Regulators
- Collect information around the details that the public require about their HWRCs
- Discover the unique identifiers held within the data to facilitate joining to other datasets and standards

Assemble and Iterate

- Map a representative sample of data available into the data structure
- Test the validity and robustness of the open data standard and open dataset with stakeholders
- Review and amend the open data standard and open dataset

Publish and Release

- Write and publish project blog posts (available here, here, here and here)
- Release all collected data and prototype standard into the open (available here)
- Publish guiding principles and road map (available here)
- Write public report (this document) and internal ODI report (available here)

Open Data Methodology

What is an open data standard?

According to the Open Data Standards Directory "An open data standard is a set of specifications (or requirements) for how some sets of data should be made publicly available. Generally, open data standards describe data about a particular subject, for example service requests (Open311) or building permits (BLDS). Like the data they describe, open data standards are generally developed "in the open", meaning that anyone who is interested has a way to contribute."

Or to put it another way, The ODI says, "Standards are documented, reusable agreements that affect us every day. Open standards for data make it easier for people and organisations to publish, access, share and use better quality data."

Why an open standard?

Data standards are vital to ensuring data published by different organisations is comparable. An open standard ensures the standard is developed with publishers, not for them.

For a data standard to be a success, it should be widely adopted by data publishers, and the resulting datasets should be accessible and usable by users of the data. To help make this more likely, the standard should be developed in the open, and then maintained in the open. It is important to gather views from those people and organisations who are expected to make use of the standard on what things are important to them, and what might encourage them to adopt the standard.

Putting working documents into an open repository so that these users, and any other interested stakeholders, can check progress is an important part of developing a standard in the open.

Steps in developing this open standard

The approach to the development of the HWRC open data standard has been developed in a systematic way. Beginning with research into other, existing open data standards, followed by stakeholder workshops to gather views from publishers and data users on requirements. This was followed by development of the standard, and supporting documentation, with another round of stakeholder workshops to help to socialise the standard, as well as report progress, and check direction. The standard was then finalised, published, and next steps agreed on.

Desktop research

Open data standards are not new, so reviewing existing standards is the natural first step in developing a new standard. For this standard, the OpenActive data standard, the 360Giving data standard, and the Brownfield Land Registers data standard were all examined, and useful or comparable elements were identified.

Stakeholder engagement – information gathering

A round of six online workshops were held in August and September 2020. These were well-attended by professionals from across the waste sector, from local authorities to private enterprises, and sector network bodies to charities. Attendees at the workshops were extremely generous with knowledge and opinions about household waste recycling centres and the data that surround them. There was very much a sense that people from across the sector recognise the need for a data standard and wanted to contribute to its development.

These workshops gave lots of information about the data that is captured by local authorities, and the sorts of things that people want to use the data for. From finding out opening hours of household waste recycling centres, to understanding what materials can be recycled at individual centres. These sessions also highlighted further areas of value that could, and should, be incorporated into future iterations of the standard like establishing benchmarks for site operators or assisting the public in moving up the waste hierarchy away from disposal and recycling to reuse and reduction.

Set up tools

The next step was to set up the tools used for creating the standard. The specification and documentation were put on Github, to allow for versioning, and issue tracking. This is a public repo, and is hosted on Open Data Manchester's Github page.

Development of the standard

The standard was developed by piecing together existing data, identified requirements, and other standards. Methods for creating unique identifiers were documented, and fields to be reported were determined to be mandatory, recommended, or optional.

Documentation

As well as the specification for the standard, additional documentation has been written to help users publish and understand the data. Explaining key concepts, identifiers, and the workflow all help to make the data more usable.

Stakeholder engagement – presentation of first iteration

In January 2021 a round of three online workshops was held to share the standard with stakeholders. Previous workshop attendees and other key stakeholders were invited to the workshops and were provided with access to the documentation ahead of the workshops. During the workshops, progress was presented to the attendees, and a series of questions were posed, and worked through. These were questions that had arisen through the development of the standard, such as whether the approach to 'catchment areas' makes sense. This step was vital to busting some of the assumptions that were made in the development of the standard and validating others.

Finalise standard and documentation

Feedback from the workshops was incorporated into the final data specification and documentation.

Document next steps

After finalising the standard – the beginnings of a roadmap for the future of the HWRC open data standard was developed, including short and medium terms actions. For short term actions, launch and subsequent socialisation of the standard is planned, while longer terms actions include deciding on stewardship and governance of the standard, processes for iterating on the standard, and continued publicity, helping the standard to become business as usual for local authorities and other users of the data. There is more detail in the section Next Steps.

Key Learnings

HWRCs are part of a complex data ecosystem

One of the activities we carried out with workshop participants was data ecosystem mapping. We learnt this technique from a workshop we had with the ODI and you can find information about it from the ODI website.

An ecosystem map allows us to plot out the key actors, technologies and flows (of data, value, power) as well as blockers and opportunities in a data ecosystem. Our data ecosystem is HWRCs and what we realised from the mapping was that in essence the map can be split into two areas with local authorities[1] at the centre.

On the one side data flows towards residents/householders going through various intermediaries, infomediaries and technologies some managed and controlled by the local authorities, some intercepting this data and presenting it without oversight from the local authorities. On the other side data flows out of the local authorities towards regulators and central government, again via intermediary technology, namely Waste Data Flow.

For the purposes of this project, we are focussing on the data flow between the local authorities and the public, but these learnings have helped us to map out next steps for further development.

When is a local authority not a local authority?

The UK operates a two-tier local authority structure regarding waste services. The Waste Disposal Authorities (WDAs) are responsible for the disposal of municipal waste in an authority. Whereas the Waste Collection Authorities (WCAs) are responsible for the collection of the municipal waste. Household Waste Recycling Centres (HWRCs) are generally the responsibility of the WDAs. However, there are arrangements within authorities, across neighbouring authorities, partnership agreements (both formally and informally) and occasions where there are unitary authorities which mean the public can be confused about who is responsible for their HWRCs and where to get information on them. These relationships (and others) were investigated as part of the ecosystem mapping during the initial round of workshops.

[1] We use the term local authorities for simplicity but realise that there is quite a lot of complexity here – waste collection authorities, waste disposal authorities, unitary authorities etc which we speak in more detail in the following section and cover in the glossary.

Consistency of data not consistency of service

While the services offered by local authorities are not consistent, the data that describes these services should be.

Different local authorities are responsible for different population types in differing geographies which has led to different services offered across the country. It is not necessarily feasible for there to be consistency of services offered, but by creating consistency in how services are described, labelled and structured should make providing the public with the information they need easier so the lack of consistency in services doesn't result in confusion. Providing this data in machine-readable formats opens up possibilities for the public to consume this information in a variety of formats that suits them.

How to accurately reflect area served

Access to HWRCs is restricted to residents. However, these restrictions parameters change around the country depending on various factors.

Generally, residents can only freely access the HWRCs that are in their Local Authority's boundary. For example, residents within Derbyshire can only use the services provided by Derbyshire County Council. However, there are scenarios where residents are excluded from specific sites. For example, Wigan residents cannot use the HWRC within Greater Manchester, even though they are part of Greater Manchester Combined Authority. Furthermore, there are situations where residents can use a neighbouring Local Authorities' HWRCs because of partnership arrangements. For example, Westminster residents can access the Western Riverside Waste Authority sites. Because of the ad-hoc nature of the arrangements each HWRC requires its own service area to indicate accepted residents. These service areas can be as simple as a local authority boundary, or require an additional file containing a complex, geospatial polygon to reflect the area served.

Centralised but not open

Local authorities are mandated to provide data on their HWRCs. This data is generally collected once a year, centralised but never released into the open but is used for tools like Recycle Now and Recycle More. This creates situations where the data that is centralised is incorrect for part of the year – HWRCs tend to operate different opening times in winter and summer, it can also lead to inconsistencies compared to local authority websites and can thus create confusion and frustration.

Local authority workshop participants also spoke of their frustrations in managing intermediary information services, like struggling to gain control of their entries on Google Maps, or incorrect information being circulated via community groups on social media.

It is hoped that a central open dataset, built upon an open data standard could help with these issues.

Bulky waste, sofa, or wood, foam and textile

Including information on materials or waste types accepted at a site is crucial, but to what level of detail. Waste classification is a complex issue with many waste stream entries in the European Waste Catalogue (EWC) codes covering a multitude of materials, for example '20 03 07 Bulky Waste' can cover a sofa, a mattress, a dining table, a swing set or a chest of drawers – each one of these items can include a variety of materials. Some members of the public are

looking for very specific information “will you accept my glass and chrome dining table?” others are happy with the term ‘bulky household waste’. The workshops highlighted the complexities in how to usefully describe waste types to the public and since no standardised list exists of granular waste type descriptions it was decided that in the first iteration of the standard we would mirror the labelling that exists on HWRC sites. We acknowledge that this is just a starting point and we have developed the standard so that additional layers of detail can be added in future iterations. This will require much more research and given other developments happening in the sector (i.e. initiatives around consistency and extended producer responsibility (EPR) and smart waste tracking) its important to ensure that this standard reflects any changes required by these measures.

Next Steps

We have identified a number of necessary activities in the next stages of the development and implementation of the open data standard for HWRCs. These broadly fall under four areas:

1) The HWRC open data standard
2) The HWRC open dataset
3) Governance
4) Further developments

The HWRC open data standard

We are working with the local authorities who attended the workshops to promote adoption and implementation of the data standard. We will also be reaching out to sector associations, primarily NAWDO[2] and LARAC[3], who’s support would be extremely valuable in establishing the open data standard.

We expect that there may be a need to provide technical assistance to local authority staff in adopting the standard, but we are unsure how much resource this will require. At this stage Your Dsposal is happy to provide this support, but it may prove necessary to fund dedicated assistance at a later date.

We are also mindful that the standard requires ongoing maintenance to keep it relevant and useful. This is discussed under Governance.

The HWRC open dataset

One of our deliverables was a prototype open dataset based upon the open data standard. We currently have data for three local authorities available here. We need to increase the data published here and we are working with local authorities to increase what is available. Again, gaining support from NAWDO and LARAC will be instrumental in improving this dataset.

This dataset is currently housed on Your Dsposal servers. We confirmed with workshop participants that this was an acceptable solution. It may be that through the upcoming work on Governance that it is deemed that this isn’t the ideal scenario for the long term and that an alternative will be required, but for the time being this option appears to be satisfactory.

[2] National Association of Waste Disposal Officers https://nawdo.org.uk/
[3] Local Authority Recycling Advisory Committee https://larac.org.uk/

Governance

Establishing an appropriate governance model for the open data standard is key to its continued success. The HWRC open data standard in its current form is fairly simple and lightweight. The ODI suggests in their Data Standards Handbook that for such a standard a formalised governance process is unlikely to be needed and its lightweight nature can improve its chances of adoption[4]. It is clear to us though that this standard is just one of a whole suite of open standards that are needed for the waste industry and so we believe that establishing a governance board will be necessary to ensure coordination of these different standards. It is clear there is no 'one size fits all' approach to determining the right governance model so we will seek to work with stakeholders, domain experts and interested parties to alight on the right form for these open data standards over the coming months. This is particularly important given that the sector is in a period of transition with numerous changes proposed to regulations and legislation through the Environment Bill.

Further developments

We have been heartened by the engagement and support we have received from workshop participants in this project and how many further areas of value and opportunity they highlighted. Improving waste data is critical to moving towards a circular economy and minimising our impact on the planet. Waste is something that every single one of us creates, it is a thread connecting the smallest of businesses to the largest and from the individual to the nation. It is unsurprising therefore that the plethora of services that exist related to waste and resource management make up a complex ecosystem. While no single piece of software or system or process can meet the needs of this ecosystem of actors, open data standards and open data are the foundation required to enable these actors to collaborate, share, compete and improve.

One avenue for extending the HWRC open data standard is to review if the basic characteristics captured for HWRCs are also relevant to all permitted waste sites.

Another area that has opened up directly as a result of the workshops is how the open dataset could be used by organisations like OPRL to improve their work to simplify messaging on recycling for the public. We have been part of a consortium bid to Innovate UK to develop this element of the standard and dataset and look at developing a new open data standard on plastic packaging.

We believe that finding and supporting real-world applications of the data standard and dataset will help to prove the value of this work and encourage wider adoption and engagement.

Roadmap for the future

We understand that the open data standard will evolve over time and we are aware that it may develop in ways we are utterly unaware of at present. Our roadmap for the future will be a living document that we review and update based on new learnings and the evolution of this standard and the sector around it.

[4] https://standards.theodi.org/creating-open-standards/managing-change-in-open-standards/

Glossary

Carbon Budgets: a carbon budget places a restriction on the total amount of greenhouse gas emissions permitted over a period of time. https://carbontracker.org/carbon-budgets-where-are-we-now/

Catchment Area: defines the geographic area from which citizens can access household waste recycling centres. Often this is based on what local authority a citizen lives in, but there are cases where there are agreements between local authorities to include or exclude certain areas.

Councils: we use the term council in this report to be a catch all term for all forms of local government including county councils, district, borough or city councils, unitary councils, London or metropolitan boroughs. https://www.local.gov.uk/about/what-local-government

Defra: Department for Environment, Food and Rural Affairs in UK Government

Environment Agency: The Environment Agency is a non-departmental public body, established in 1995 and sponsored by the United Kingdom government's Department for Environment, Food and Rural Affairs (Defra), with responsibilities relating to the protection and enhancement of the environment in England.

European Waste Catalogue (EWC) codes: An EWC Code is a six-digit code used to identify waste as listed in the European Waste Catalogue. It is formatted as three pairs of numbers, for example 12 34 56. It identifies and classifies waste into categories according to how these wastes have been produced.

Fly tipping: is a British term for the illegal dumping of liquid or solid waste on land or in water.

Household Waste Recycling Centre (HWRC): A HWRC is a staffed place where residents can take household waste to be recycled or disposed of. Each local authority area has a legal responsibility to provide this service to residents, and the service is usually provided in multiple sites across the local authority area. HWRCs might be known by different names in different areas, or by different people. Some examples of this are:

- civic amenity (CA) sites
- community recycling centres (CRCs)
- household-waste and recycling centres (HWRCs)
- household-waste sorting sites (HWSSs)
- household recycling centres (HRCs)
- household re-use and recycling centres (HRRCs)
- household-waste recovery centres (HWRCs)
- re-use and recycling centres (RRCs)
- recycling and waste centres (RWCs)
- tips
- dumps

LARAC: The Local Authority Recycling Advisory Committee represent local authority views in waste and recycling issues.

Local Authorities: we use the term local authorities in this report to be a catch all term for all forms of local government including county councils, district, borough or city councils, unitary councils, London or metropolitan boroughs. It includes both two-tier and unitary authorities. https://www.local.gov.uk/about/what-local-government

NAWDO: The National Association of Waste Disposal Officers is the primary network for senior waste managers within local authorities with statutory responsibilities for Waste Disposal.

Waste Collection Authorities: A waste collection authority is a local authority charged with the collection of municipal waste. In two-tier authorities they will generally be the district councils and they will then pass on the waste to the Waste Disposal Authority. A unitary authority acts as both the Waste Collection Authority and the Waste Disposal Authority. HWRCs tend to be the responsibility of Waste Disposal Authorities.

Waste Disposal Authorities: waste disposal authorities have statutory responsibility for municipal waste disposal. They manage the waste that is collected by Waste Collection Authorities. In the case of unitary authorities they will be both the waste disposal and waste collection authority. HWRCs tend to be the responsibility of Waste Disposal Authorities.

Resources

Blog: Press release announcing project https://dsposal.uk/your/articles/new-waste-data-project/

Blog: Project kick off blog https://dsposal.uk/your/articles/open-waste-data

Blog: Project halfway update blog https://dsposal.uk/your/articles/odi-halfway

Blog: Data standards update blog https://dsposal.uk/your/articles/hwrc-data-standard

Open data standard for HWRCs: https://github.com/OpenDataManchester/Open3R

Open dataset of HWRC information: https://github.com/OpenDataManchester/Open3R/blob/main/8_Supporting_Files/8_2_1_HWRC_Main_Example.csv

Guiding Principles: https://dsposal.uk/your/articles/open3r/

Roadmap: https://dsposal.uk/your/articles/open3r/

Acknowledgements

The authors would like to thank the ODI for their support and funding without which this project would still be on the ‘to do’ list.

A special thank you also goes out to all those who generously gave us their time, expertise and insights during our workshops and via email. We’re really grateful to you and we hope this open data standard and open dataset can help to improve the sector and make life a little easier for all the actors we identified in the data ecosystem map.

And finally, thank you to the open data community for pioneering new ways to do things that benefit society, the environment and the economy – we’re learning from you all the time and following your lead.

Get Involved

If you’d like to adopt the open data standard for HWRCs and/or add your data to the open dataset please contact Tom Passmore: tom@yourdsposal.uk