Investigation into the impact of the COVID-19 pandemic on the collection of household Waste Electronics & Electrical Equipment (WEEE)

Final report

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MATERIAL
FOCUS

Investigation into the impact of the COVID-19 pandemic on the collection of household Waste Electronics and Electrical Equipment (WEEE)

Material Focus

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1. Glossary of key terms

Bulky Kerbside: Kerbside collections of WEEE conducted by Local Authorities (LAs)

Business as usual (BAU) collections: The quantity of collections that are assumed would have taken place in 2020 had the pandemic not occurred. Within the model it is assumed that this is the upper limit of any collections that can take place, unless otherwise indicated in the 'changes in collection quantity' modulators. This calculation is denoted as Stage 3 on the flow chart in Figure 3.

DCF: Designated Collection Facility authorised to undertake the separate collection of waste electronics and electrical equipment (WEEE) prior to treatment.

Estimated total WEEE arisings: The total quantity of WEEE estimated to have been generated in the UK in 2020 (both collected and uncollected).

HWRC: Local authority household waste and recycling centres.

Modelled actual WEEE collections: This refers to the amount of collections that are modelled to have actually taken place in 2020.

Regulation 43: Under the UK WEEE Regulations 2013, Regulation 43 collections represent household WEEE collected by distributors (e.g. retailers) via in-store takeback and returned to the system via producer compliance schemes (PCS).

Regulation 50: Under the UK WEEE Regulations 2013, Regulation 50 collections represent WEEE returned via non-DCF, non-distributor takeback collections, such as returns of household WEEE directly to producers (linked to a PCS).

WEEE available for collection: The quantity of household WEEE that is expected to be available for collection via each studied collection stream (HWRC, bulky kerbside, Regulation 43 and Regulation 50). This is distinct from the BAU WEEE collections as it is specific to each collection stream and takes into account the modulation factors entered on the dashboard (e.g. disposal behaviour). This phase is denoted as Stage 4 in the Expanded COVID-19 Impacts model input flow diagram. Within the modelled scenario described in the report there has been no modulation of disposal behaviour. Therefore, in this instance the WEEE available for collection is assumed to be equal to the BAU collections.

WEEE inaccessible for collection: The difference between the 'WEEE available for collection' and the 'Modelled actual WEEE collections' (see below). In this report, WEEE inaccessible for collection is taken to represent the impact of the COVID-19 pandemic on the collection of WEEE due to disruptions to Local Authority collection services e.g. bulky collection service suspensions and HWRC temporary closures or restrictions.

2. Executive summary

The purpose of this research was to investigate the impact of the COVID-19 pandemic on the reported collection of household waste electronics and electrical equipment (WEEE) in the UK and was originally guided by two key strategic aims. The primary aim was to quantify where and at what rate household WEEE was building up in the UK system, broken down by product types. The second aim was to quantify the regional impacts of changing household EEE purchase habits as a result of COVID-19, as well as changes in household WEEE hoarding, reuse, recycling and residual disposal rates. The research successfully addressed the primary aim of modelling and forecasting bottlenecks in the UK WEEE system. However, due to an absence of a meaningful pre-COVID-19 baseline for comparing regional household purchase and disposal behaviour, the second aim could not be addressed.

As part of this investigation, the COVID-19 WEEE Impacts model was created by Oakdene Hollins and Valpak to forecast the expected arisings and collections of WEEE from the start of the year (2020) and the national lockdown starting on 23 March, continuing to the subsequent relaxing of lockdown measures. This modelling is performed using a combination of Environment Agency (EA) data, the EU WEEE arising calculation tool, stakeholder engagement through surveys, and information gathered from surveys conducted by the Association of Directors of Environment, Planning and Transport (ADEPT).

As mentioned, a lack of robust data has hampered this study. The key data constraints have been the limited regional data for forecasting more nuanced differences in tackling WEEE collection and lower than anticipated survey participation rates, chiefly as a result of staff shortages and disruptions due to COVID-19. Furthermore, the EU WEEE arising calculation tool was used despite known criticisms of its ability to handle nuance and interpretation of historic data, due to lack of a better alternative. However, the present model is developed so that with more accurate, granular data, the accuracy of the forecasts will improve. The model also has built-in flexibility for Local Authority (LA) users to input their own historical data and forecast WEEE arisings and collections in their area.

Upon feedback from a network of Local Authorities and producer compliance schemes (PCSs), two versions of the COVID-19 Impacts model were made available. The first version made available to all stakeholders is the 'simplified' model which allows users to model their own unique situation. This does not allow for any modulation of the collection scenario over the course of the year. The second 'expanded' model expands upon the simplified version, by also including access to all potential 'modulators' for a

given collection scenario and changes to disposal behaviour by households. In addition to the feedback from LAs and PCSs, the model's forecasts were also validated against EA data for Q2 and Q3 2020, and Local Authority data sources, where available. Refinements were made to make the model more robust and user-friendly.

Figure 1 Breakdown of COVID-19 Impacts model WEEE flow results 2020 (including actual Q1 & Q2 2020 Environmental Agency WEEE collections data, pre-Q3 data inclusion; Q3 & Q4 modelled)
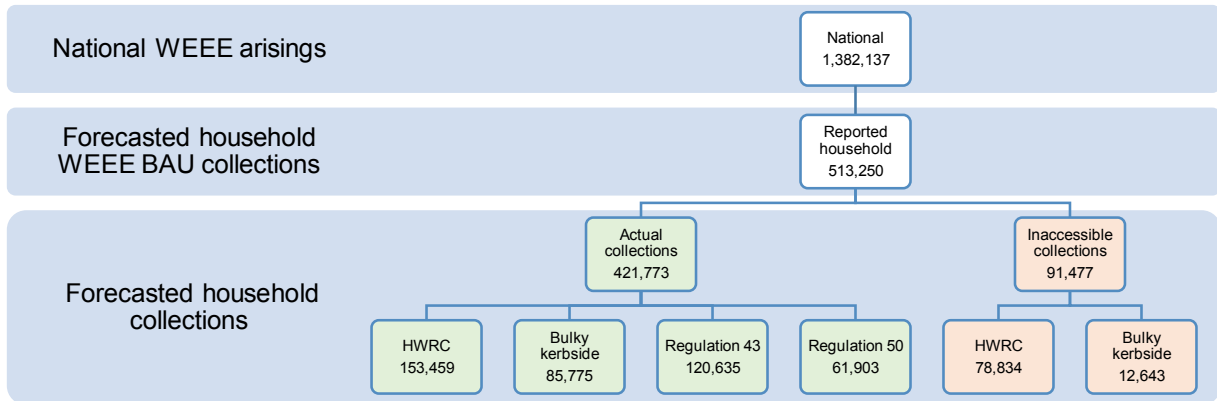
Figure 2 Breakdown of COVID-19 Impacts model WEEE flow results 2020 (modelling adjusted to include actual Q1-Q3 2020 Environment Agency WEEE collections Data; Q4 modelled)
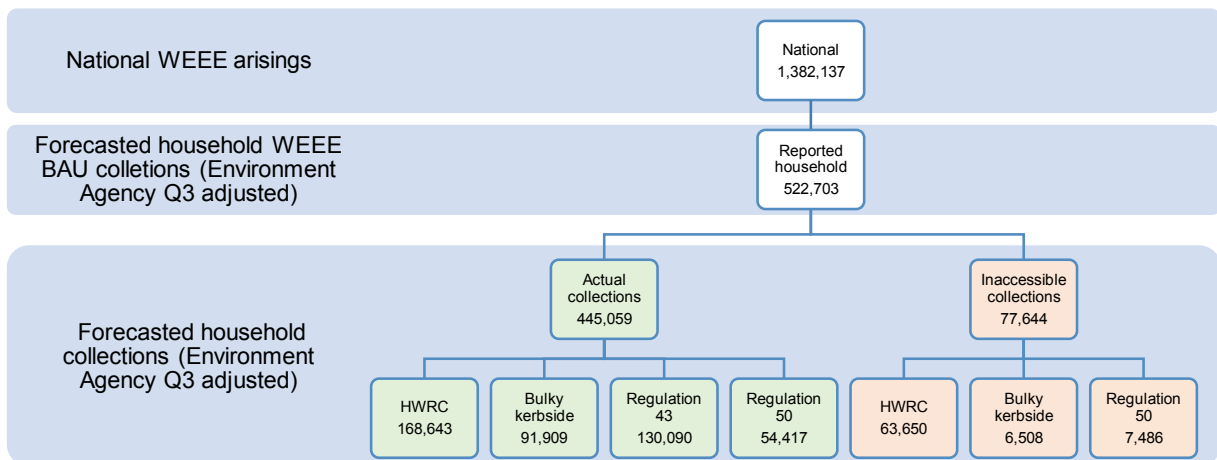
As can be seen in Figure 1 and Table 1 (modelling inclusive of Q1 & Q2 2020 EA WEEE collections data), it is estimated that there will be 1,382,137 tonnes of total household WEEE arisings in the UK throughout 2020, of which approximately 513,250 tonnes will be available for reported collection via HWRCs (232,294), bulky kerbside

collections (98,418), regulation 43 (120,635) and regulation 50[1] (61,903). Under normal (non-COVID) circumstances, this is the expected quantity of WEEE to have been reported as collected via each channel in 2020. Within the model this is referred to as the business as usual (BAU) collections and acts as the control scenario.

Also referring to Figure 1 and Table 1, over the course of 2020, the COVID-19 Impacts model initially predicted that there will be a total of 91,477 tonnes of WEEE collections that are 'inaccessible" to Designated Collection Facilities (DCF) collection channels. These inaccessible collections represent WEEE tonnes that would have normally been collected through HWRCs and bulky kerbside collections but, due to COVID-related disruptions, this potentially did not take place. Breaking this down, the COVID-19 Impacts model estimates 78,834 inaccessible tonnes from HWRCs and 12,643 inaccessible tonnes from bulky kerbside collections. However, when adjusting the model to also take into account more recent WEEE collections data published by the Environment Agency, it can be seen that the original modelling underestimated the quantities of collections that would take place from HWRCs, bulky kerbside and under Regulation 43, as well as overestimating the Regulation 50 collections. This can be observed from Table 2 and Figure 2, which present the adjustments to the COVID-19 Impacts model's original outputs to account for differences compared to the published EA collections data for Q3.[2]

Similarly, the household EEE placed on the market (POM) in 2020 was initially projected to be 1,444,000 tonnes, based on data from the EA and Valpak and accounting for potential freerider products. However, the revised projection for 2020 using the more recently published Q3 data is 1,495,419 tonnes, 3.6% higher than the earlier prediction. This projection for 2020, if proven, would also be 5.9% higher than the EEE POM in 2019 (1,411,784 tonnes). Almost all categories are projected to experience various levels of growth in sales in 2020 apart from two categories: Monitoring and Control Instruments, and Gas Discharge Lamps and LED Light Sources. Model estimates for these two categories are more erratic due to variations and gaps in historic reporting data.

Based on the COVID-19 Impacts model analysis, bulkier WEEE streams such as Large Domestic Appliances (LDAs), Cooling Appliances Containing Refrigerants and Display Equipment saw higher proportions of inaccessible collections. It is speculated that this is

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[1] Under the UK WEEE Regulations 2013, Regulation 43 collections represent goods returned to producers from private households, whereas Regulation 50 refers to WEEE collected via take-back schemes.
[2] The method for adjusting the data for the Environment Agencies Q1-Q3 actual report data assumes that the proportional change in HWRC and bulky kerbside collections are equal in both collections (e.g. if the impact model underestimated DCF collections by 10% both HWRC and bulky kerbside collections were increased by 10% to estimate the adjusted figures).

largely due to the restricted flow of these product categories at HWRC sites and via bulky kerbside collections (owing to service disruptions) over the course of the lockdown.

Table 1 COVID-19 Impacts model predicted actual HWRC, Bulky kerbside, DCF, Regulation 43 and Regulation 50 collections 2020 (modelling inclusive of actual EA Q1 & Q2 2020 collections data)

	WEEE Category	HWRC	Bulky kerbside	DCF (HWRC+Bulky kerbside)	Regulation 43	Regulation 50
a	Large domestic appliances (LDAs) other than cooling appliances	33,992	35,133	69,125	79,471	22,618
b	Cooling appliances containing refrigerants	29,064	36,209	65,273	37,877	9,706
c	Display equipment containing cathode ray tubes (CRTs)	17,121	9,922	27,043	1,176	4,292
d	Gas discharge lamp incl LEDs (Light emitting diodes)	628	13	642	216	2,987
e	All other WEEE; Small mixed WEEE (SMW)	72,399	4,420	76,818	1,891	22,266
f	Photovoltaic panels (solar panels)	255	78	333	4	34
	Total	**153,459**	**85,775**	**239,234**	**120,635**	**61,903**

Table 2 COVID-19 Impacts model predicted actual HWRC, Bulky kerbside, DCF, Regulation 43 and Regulation 50 collections 2020 (modelling adjusted to include actual EA Q1 - Q3 2020 collections data)

	WEEE Category	HWRC	Bulky kerbside	DCF (HWRC+Bulky kerbside)	Regulation 43	Regulation 50
a	LDAs other than cooling appliances	35,888	37,093	72,981	84,665	22,460
b	Cooling appliances containing refrigerants	30,974	38,588	69,562	42,190	9,031
c	Display equipment containing cathode ray tubes (CRTs)	19,263	11,163	30,426	1,247	3,108
d	Gas discharge lamp incl LEDs (light emitting diodes)	683	14	697	184	2,578
e	All other WEEE; (SMW)	81,612	4,982	86,594	1,781	17,192
f	Photovoltaic panels (solar panels)	223	68	291	23	48
	Total	**168,643**	**91,909**	**260,552**	**130,090**	**54,417**

In addition to developing the COVID-19 Impacts model, the project team carried out surveys (see full results in Appendices) to shed light on how the situation was managed by Local Authorities and Approved Authorised Treatment Facilities (AATFs). Findings from these surveys indicated that there were no significant capacity bottlenecks once collection and processing re-opened. One potential area for improvement is that, understandably given the unprecedented challenges posed by COVID-19, there was a lack of clear, coherent messaging to residents on HWRC and bulky kerbside collection accessibility. This also added complexity for managing collection and processing on site. With social distancing measures such as booking systems likely to be kept in place for longer, there are opportunities to rethink how interactions leading up to a trip to an HWRC could be used to educate consumers and encourage responsible disposal of WEEE.

This research modelled and analysed the impact of COVID-19 in 2020 on the EEE POM and on WEEE arising and collected, and quantified the potential build-up in the system. The key findings are summarised in Table 3 . Given the significant data barriers faced by the project, confidence in data and areas for improvement are also presented.

Table 3 Summary of key findings from the model, confidence in supporting data, and areas for improvement

Area of interest	Key findings	Confidence in supporting data	Areas for improving data quality
Household EEE POM	In 2020, a total of 1,495,419 tonnes of household EEE are forecasted to be placed on the UK market, growing by 5.9% compared to 2019. This figure was revised up from the original estimate of 1,444,000 tonnes after taking into account Q3 POM data published by the Environment Agency.	High	POM data for certain categories show significant fluctuation across years. A better understanding of the cause of such fluctuation would help fine-tune the model.
Household WEEE arising	In 2020, a total of 1,382,137 tonnes of household WEEE are forecast to be arising, which is 1.4% lower than the amount forecasted for 2019.	Medium	Future iterations of the EU tool and other Waste-Over-Time models for predicting WEEE arising should address impacts of various socio-economic and socio-demographic factors.
Forecasted household WEEE available for collection	Out of the total WEEE arising nationally, 513,250 tonnes are forecast to be available for collection through HWRC, bulky kerbside, Regulation 43, and Regulation 50 channels in 2020 by the COVID-19 Impacts model. When adjusted for Environment Agency reported data Q1-Q3 the forecast changes to 522,703 tonnes.	Medium	Since collection operations adapt to disposal behaviour, forecasts of WEEE available for collection will improve with more robust WEEE arising figures.
Forecasted actual household WEEE collections	421,773 tonnes of WEEE are forecast to be collected through HWRC's, bulky kerbside, Regulation 43, and Regulation 50 channels in 2020 by the COVID-19 Impacts model. When adjusted for Environment Agency reported data Q1-Q3, the forecast changes to 445,059 tonnes.	Medium-Low	Results can be improved with DCF collection data disaggregated by source (HWRC, bulky kerbside)
Forecasted WEEE inaccessible for collection (due to COVID-19 impacts)	91,477 tonnes of WEEE are forecasted as inaccessible to DCF collection channels by the COVID-19 Impacts model. When adjusted for Environment Agency reported data Q1-Q3, the forecast changes to 77,644 tonnes.	Low	Results can be improved with more regional data or user-defined local scenarios to reflect adaptations in collection operations

3. Context and objective

On 23 March 2020, in response to the COVID-19 pandemic, the United Kingdom went into lockdown. At this time, the British public were instructed to only leave their homes for essential purposes and to work from their homes whenever possible.

This lockdown caused huge disruption and had wide-ranging impacts across almost every sector of the UK economy, including the waste collection sector, with many HWRC collection facilities closing their sites or limiting their collections as a result of the lockdown with little guidance or planning. This study was commissioned by Material Focus to investigate the impact of COVID-19 on the collection of waste electrical and electronic equipment (WEEE) throughout the 2020

The primary objective of this study was to quantify where and at what rates household WEEE was building up in the UK system, broken down by product types. To achieve this, a tool (or model) was also to be created that would allow key stakeholders to model the impact of the lockdown on their own unique circumstances. Originally, the project also aimed to quantify the regional impacts of changing household EEE purchase habits as a result of COVID-19, as well as changes in household WEEE hoarding, reuse, recycling and residual disposal rates. However, due to an absence of a meaningful pre-COVID baseline for comparing consumer behaviour, the second aim could not be addressed.

With the objective of quantifying the build-up of household WEEE during lockdown, this investigation was conducted by Oakdene Hollins in collaboration with Valpak. The study used stakeholder engagement and surveys, alongside historic WEEE collection data and information from surveys conducted by the Association of Directors of Environment, Planning and Transport (ADEPT) over the course of the pandemic.[3] This information was then fed into the development of the WEEE COVID-19 Impacts model which aimed to model and forecast the impact of the COVID-19 pandemic on the quantity of collections taking place over the course of 2020. This was compared with a modelled scenario in which COVID-19 didn't happen.

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[3] ADEPT. Covid 19 - waste survey results. 2020. https://www.adeptnet.org.uk/covid-19-waste-survey-results

4. Methodology

4.1 Survey and stakeholder knowledge gathering

To understand the unfolding situation from the perspectives of producers, Local Authorities and AATFs, the project team developed and distributed surveys through the networks of Material Focus and Valpak. Producer survey questions covered topics such as trends in sales quantities and channels, product returns and suggestions for future improvements for the management of the lockdown. Local Authority and AATF survey questions covered topics such as trends in the flow of WEEE into sites, expected period of recovery and short-term surges, processing and storage capacity and suggested improvements for the future. It must be noted that due to the sample size, these surveys could not be considered to be representative of the whole country but instead were intended to inform and give insight into conditions on the ground and to sense check and inform the COVID-19 Impacts model's construction and outputs. To this end, anecdotal evidence was also gathered from industry stakeholders involved in collection, processing, online sales and facilitating reuse.

Originally, it was the intention that WEEE COVID-19 Impacts model would take into account data collected on changes in consumer sentiment towards the purchase, disposal, recycling and reuse of electrical and electronic equipment (EEE) as a result of the COVID-19 pandemic. However, upon further investigation it was found that there was no statistically meaningful baseline of these attitudes that could be used to make any valid comparisons within the model. Subsequently, these factors have not been built into the final COVID-19 Impacts model.

4.2 Model development and forecasting

In order to estimate the impacts of the COVID-19 pandemic on WEEE collections the COVID-19 Impacts model creates two scenarios. These scenarios are a business as usual (BAU) scenario, which models the likely arisings and collections throughout 2020 had the pandemic not occurred; and a 'modelled' scenario which reflects the scenario designed by the user.

At a high level, the methodology behind the creation of these two scenarios relies on the linear extrapolation of historic Environment Agency data for collections of household WEEE via designated collection facilities (DCFs), Regulation 43 and Regulation 50, to estimate the likely collections in 2020 and form the BAU scenario. This BAU scenario is then 'modulated' (or, adjusted) to create the second modelled scenario.

Figure 3 outlines the flow of the inputs into the expanded COVID-19 Impacts model. Additionally, Figure 4 depicts the input flow diagram of the simplified COVID-19 Impacts model that is being disseminated to key stakeholders. In the following sections the methodologies of model stages 1 to 6, as marked in Figure 3 for the expanded COVID-19 Impacts model, will be briefly outlined.

Figure 3 Expanded COVID-19 Impacts model input flow diagram
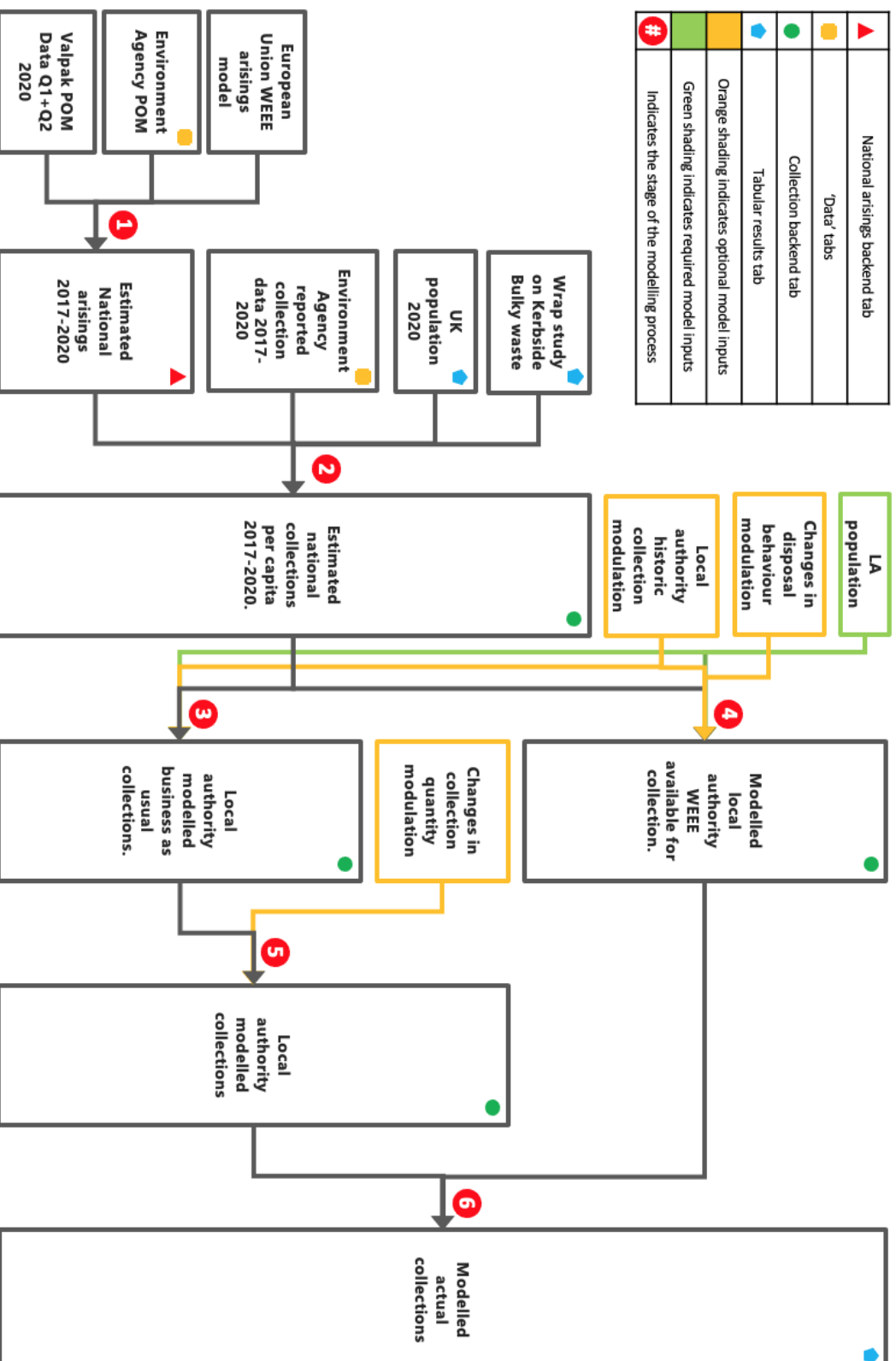
Figure 4 Input flow diagram for simplified COVID-19 impacts model being disseminated to stakeholders
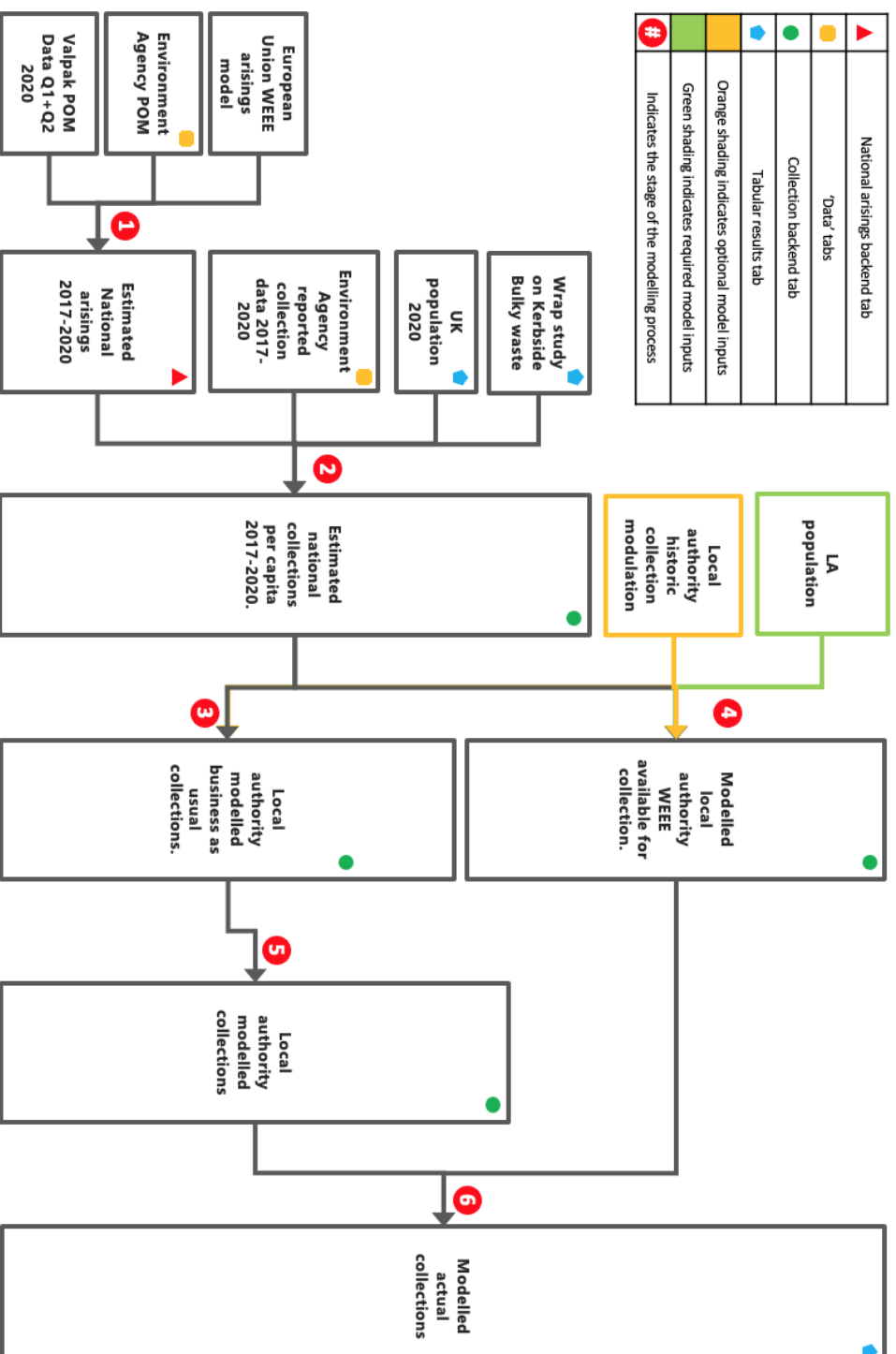
Stage 1 Estimating total national WEEE arisings

The first stage in the methodology is to estimate the total national WEEE arisings for the whole of the UK. Within the COVID-19 Impacts model, these arisings form the basis of all the extrapolations of WEEE generation and collection over the course of 2020.

The COVID-19 Impacts model utilises the WEEE calculation tool published by the European Commission[4] ('EU Tool'), alongside the quantity of household EEE placed on the market (POM) as reported by the Environment Agency, as the means of estimating the UK's WEEE arisings. Actual POM data from Q1 to Q3 2020 are extrapolated to estimate the total POM for 2020. This is based on the historical share of contribution of Q1-Q3 to the full year (averaged across 2017 to 2019).

Recent work by compliance scheme REPIC[5] and researchers at Lancaster University have criticised the EU tool in the sense that it lacks nuance and does not reflect the impact of historic changes in GDP per capita, consumer confidence index, and various other socio-demographic factors. A comparison of the national arising figure from this model with Anthesis' recent report for Material Focus[6] showed that the WEEE arising figure in 2017 projected by the EU tool was 12% above that calculated by Anthesis. For the purpose of this research and without a better model available, the project team has chosen to proceed with the EU tool for forecasting national arisings.

As EEE often resides in peoples' homes for an extended period of time (e.g. in use, reuse and then hoarded) before becoming WEEE, it is typically historic (i.e. available data), rather than contemporary, changes in POM that have the greatest impact on current and near-term national WEEE arisings. Therefore, it was deemed appropriate to use averages across a longer period for modelling and forecasting. Trends in the historic data from 2010-2019 were linearly extrapolated forward to forecast potential arisings in Q3 and Q4 of 2020.

To further improve accuracy, the POM data inputs to the EU Tool were also scaled up to account for an additional 7% of potential freerider products placed on the market within the UK scheme. This proportion is informed by the same Anthesis / Material Focus study of unreported WEEE flows.[6]

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[4] European Commission, WEEE calculation tools: https://ec.europa.eu/environment/waste/weee/data_en.htm
[5] Recycling Electrical Producers' Industry Consortium (UK)
[6] Anthesis. 2020. Electrical Waste – challenges and opportunities: https://www.recycleyourelectricals.org.uk/report-and-research/electrical-waste-challenges-and-opportunities/

Stage 2 Modelled national BAU collections per capita

In stage 2 of the model, the national arisings calculated in stage 1 are used to project the likely national collections of WEEE from DCFs and under Regulations 43 and 50. This is done by first calculating the average ratio between the calculated national arisings from the EU tool and the EA's reported DCF, Regulation 43 and Regulation 50 collections between 2017 and 2019. These averaged ratios are then applied to the estimated national arisings from the EU tool for Q2-Q4 2020 to estimate the likely BAU collections from DCFs and under Regulation 43 and 50 for the year[7] (i.e. as though COVID-19 had not happened).

To enhance the utility of the COVID-19 Impacts model, projected DCF collections were disaggregated into collections from HWRCs and from bulky kerbside WEEE collections. The method for doing this relied upon first estimating the likely bulky kerbside collections that would have occurred in 2020 in the BAU scenario and then assuming that HWRC collections were equal to the total DCF collections minus the calculated bulky kerbside collections in each quarter.

The likely bulky kerbside collections were derived on a per-capita basis from figures available in a 2012 WRAP[8] study titled 'Composition and re-use potential of household bulky WEEE in the UK'.[9] For the purposes of the study this method was thought to be adequate, although it has been brought to the project team's attention that the proportion of bulky waste collections from individual Local Authorities (LAs) is likely to have increased since the referenced study was conducted and, as a result, this is considered to be a likely source of error within the COVID-19 Impacts model.

After total national tonnages of BAU collections are calculated for each collection stream (HWRC, Bulky kerbside, Regulation 43 & Regulation 50), they are then divided by the population of the UK to arrive at estimates of the per-capita collection of WEEE by all noted collections streams.

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[7] In some instances it was necessary to omit the ratios from certain years for some WEEE categories due to the variation in data reporting across the time period considered.
[8] Waste & Resources Action Programme
[9] WRAP. 2012. https://www.zerowastescotland.org.uk/sites/default/files/WEEE%20-%20bulky%20waste%20summary.pdf

Stage 3 Modelled Local Authority business as usual (LA BAU) collections

Stage 3 seeks to convert the per-capita estimates calculated in stage 2 into specific modelling scenarios by multiplying them by the population entered within the COVID-19 Impacts model's dashboard. This is a purely 'top down' approach to modelling. However, given the limited availability of data to conduct bottom-up analysis for verification this was thought to be the optimum method for approximating local WEEE flows. Unless modified, both the simplified and expanded Impact models will assume the population to be equal to the Office of National Statistics (ONS) 2020 mid-year estimate for the UK, as has been used in the national scenario described in this report. This will result in modelling an overview of collections across 2020 for the UK.

As there is known to be a large variability in collections across LAs in the UK, both the expanded and simplified versions of the COVID-19 Impacts model include an option on the dashboard to enter historic LA WEEE collection data. This data will then be used to derive a new per-capita figure tailored to the specific LA, which will be used in place of the national per-capita estimates to model both WEEE available for collection and collections that are more reflective of the local situation.

One of the original goals of this study was to investigate for correlations between socio-demographic factors and per-capita WEEE waste collections, with the intention of including these findings as a modulating factor in the COVID-19 Impacts model. Our investigation used the indices of multiple deprivation (IMD) as a proxy for all socio-demographic factors and these were compared with collections data from LAs managed by Valpak. However, the results of this study indicated no statistically significant correlation between the IMD and the per-capita collections of each LA and so this modulation was not included within the COVID-19 Impacts model.

WEEE collections at a LA level are subject to the interactions of a large number of variables, of which IMD is only one. Therefore, it is unsurprising that such a simplistic methodology was unable to discern any clear statistical relationships. The further study of the relationships between these variables and which are the most significant determinants of WEEE arising/collected would be an interesting area for future research and would be helpful in improving the accuracy of the model.

Stage 4 Modelled WEEE available for collection, (LA BAU collections adjusted for 2020 disposal trends)

Within the modelled scenario described within this report, the WEEE available for collection across all collection channels are assumed to be equal to the expected BAU collections (i.e. not adjusted for any 2020 household WEEE disposal trends). However,

in the expanded COVID-19 Impacts model specifically, both HWRC and bulky kerbside WEEE available for collection may be modulated on the dashboard to reflect any changes in disposal behaviour over the course of the year. However, these modulators have not been used in the national model presented in this report due to a lack of data.

As with most other modulators within the COVID-19 Impacts model, the changes in disposal behaviour can be manipulated on the dashboard, with the user expressing any changes as a proportion of expected BAU WEEE available for collection (for example, if a Local Authority using the model notices a 10% increase in WEEE available for collection via HWRCs in Q3, this would be entered as '110%' in the modulator over the same period and the estimated per capita figures for Q3 HWRC collections would be multiplied by this input).

Stage 5 Modelled collections adjusted for 2020 collection capacity changes

Modelled potential collections are calculated by multiplying the expected BAU collections by the 'modelled scenario' which expresses the quantity of collections as a proportion of BAU collections. This figure is intended to indicate the impact of disruption on the functioning of each collection system (HWRCs and Bulky kerbside collections) due to the pandemic and forms the core of the COVID-19 Impacts model for 2020, effectively dictating the quantity of collections estimated to be achieved in each month.

In the simplified COVID-19 Impacts model these collection model components are locked in as the modelled scenarios depicted in Figure 6 and Figure 7, whereas in the expanded COVID-19 Impacts model users are able to customise these scenarios themselves to reflect local service disruptions across 2020.

Stage 6 Modelled actual 2020 collections

The actual collections are then taken to either be equal to either the modelled collections adjusted for 2020 collection capacity changes (stage 5), or the modelled WEEE available for collection (stage 4), whichever is the lower.

In many cases the modelled WEEE available for collection is higher than the modelled actual collections; the difference between the two is considered to have been due to WEEE available for collection that was inaccessible to local collection services e.g. due to closures of or entry limitations at HWRCs or disruptions to bulky kerbside collection services.

5. Key findings

5.1   What happened to WEEE collection during the lockdown?

In the period between 5 April and 7 September 2020, ADEPT published surveys of council waste services which indicated the impact of the pandemic on various collection systems (see Figure 5).

Figure 5 Changes in various collection systems during the pandemic compared to BAU, derived from April - July ADEPT surveys (100% = no change to BAU, 0% = complete change from BAU)
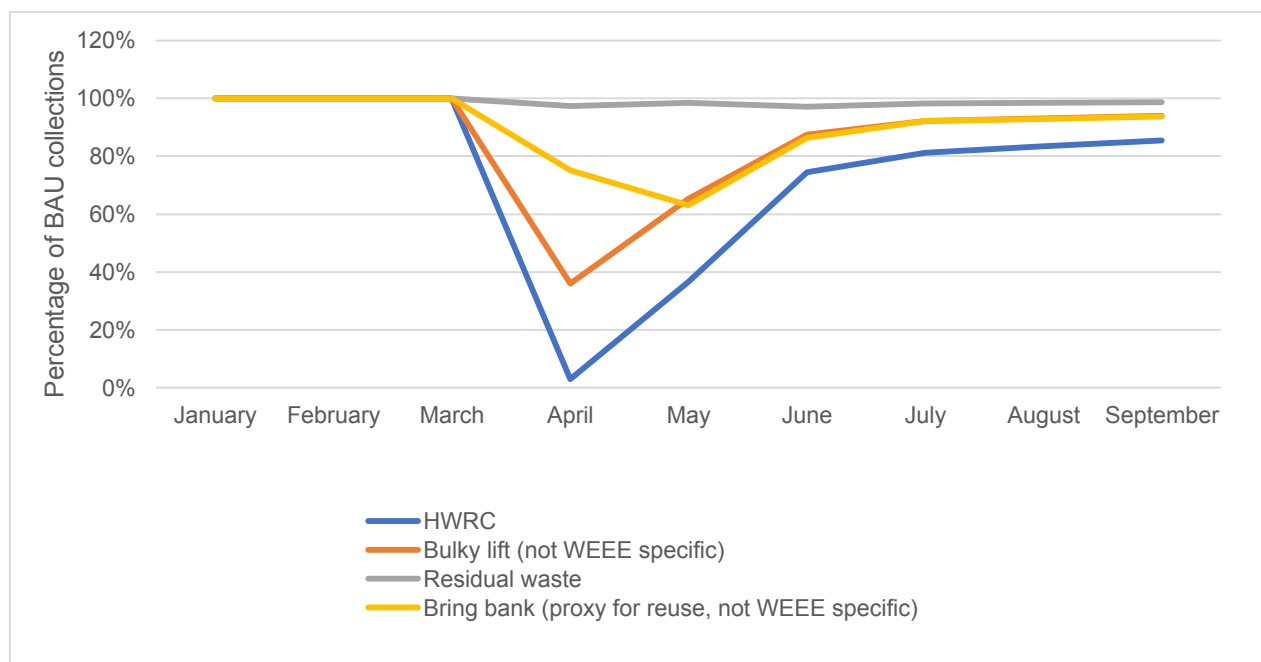
These survey results were the predominant means used to understand the impact of the lockdown on LA operations and hence the modelling of WEEE collections over the year. The COVID-19 Impacts model itself relies upon two distinct collection 'model components': one for bulky kerbside collections and one - more detailed - for HWRC collections. The bulky kerbside collection model component (see Figure 6) is based primarily on the results of the ADEPT surveys but also takes into account information gathered from stakeholder engagement with WEEE collectors and processors conducted by Material Focus. This model component assumed that no further significant disruptions would occur, and bulky kerbside collections would return to 97% of BAU collections by December 2020.

Figure 6 Bulky kerbside collection model component
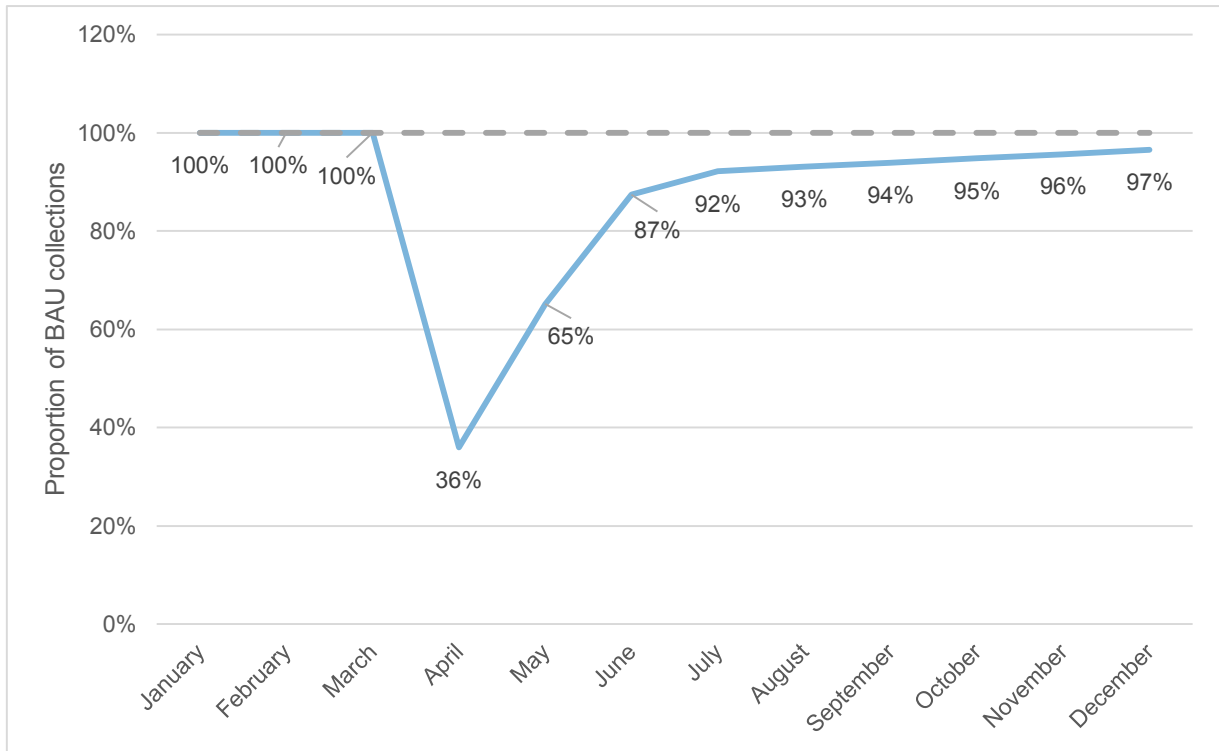
Unlike the bulky kerbside model component, the HWRC collection model component specifies a unique scenario for each WEEE stream collected. This HWRC model component is built primarily from collection data from DCFs over Q1 and Q2, as reported by the Environment Agency. Within this part of the model component, the operating capacity for collections (% BAU) is set to equal the actual collections as reported in Q2 by the EA, to increase to 95% of BAU collections by September 2020 and to remain at this level until the end of the year.

This assumption was based on the feedback from our survey of Local Authorities, most of which indicated that they expected their operations to almost be back to normal operating capacity within three months of the end of the first lockdown.

The decision to then model HWRC collections as remaining at 95% of what would have been expected to be collected from September-December 2020 was taken to reflect the impact of continuing lockdown measures (e.g. limited capacity in the form of reduced hours, booking or number plate entry systems for HWRCs, social distancing at collection and processing sites, etc.). On 31 October, a second national lockdown came into effect for England. The model continues to assume a predominantly English

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scenario where HWRCs remained largely open throughout this second lockdown.[10] This was consistent with the results of our surveys of WEEE collectors, many of whom indicated that they did not think a second lockdown would have as large an impact on their operations, having learned the lessons of the first lockdown. However, in Wales, a two-week 'firebreak' mandated that HWRCs close; Welsh LAs using this model should adjust this input in the expanded COVID-19 Impacts model accordingly.

Another limitation of this methodology is that it only considers the fate of reported WEEE collections and can make no indication of either the fate of WEEE tonnages inaccessible to DCF collection channels, or of unreported WEEE flows such as WEEE in residual waste or illegal exports. For bulky items such as large household appliances and cooling equipment, these will either be stored until they could be taken to HWRCs, or they could be collected by other carriers and sold on for scrap; in the latter case, the amount of WEEE captured and processed through this route will not be reflected in reporting. Past research also indicates that lower value, smaller, frequently replaced items are more likely to be lost in the residual waste stream. Meanwhile, higher value, data-bearing devices are likely to be hoarded.[6]

It must also be noted, that the COVID-19 Impacts model relies upon a potentially inaccurate attributional approach to allocating WEEE collections from the 14 categories reported by the Environment Agency back into the A-F collection categories predominantly referenced within this report and familiar to LAs.[11] Although this will have no effect on the total tonnes of WEEE reported it does present a potential source of error within the model when reporting on the split of individual collection streams.

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[10] Joshua Doherty. Letsrecycle.com. 2020. https://www.letsrecycle.com/news/latest-news/waste-services-well-prepared-for-lockdown/

[11] To give further explanation, in order to present the final results of the model in the A-F collection categories that are recognised by Local Authorities, it is necessary to reverse the Small Mixed WEEE (SMW) and Large Domestic Appliance (LDA) Protocol conversions undertaken by the Environment Agency. The attribution of each of the A-F collection categories can be seen in brackets alongside each of the WEEE categories indicated in Table 4.

Figure 7 Detailed HWRC collection model component

Legend:
- Large Household Appliances (A)
- Small Household Appliances (E)
- IT and Telecoms Equipment (E)
- Consumer Equipment (E)
- Lighting Equipment (E)
- Electrical and Electronic Tools (E)
- Toys Leisure and Sports (E)
- Medical Devices (E)
- Monitoring and Control Instruments (E)
- Automatic Dispensers (E)
- Display Equipment (C)
- Cooling Appliances Containing Refrigerants (B)
- Gas Discharge Lamps and LED Light Sources (D)
- Photovoltaic Panels (F)
- Business as usual (BAU) 2020

5.2   Projections for the UK (W)EEE system in 2020

5.2.1   Notable trends in EEE sales

The household EEE placed on the market (POM) in 2020 was initially projected to be 1,444,000 tonnes, based on data from the Environment Agency and Valpak and accounting for potential freeriders. With the recent release of Q3 POM data, the revised projection for 2020 is 1,495,000 tonnes, which is 3.6% higher than the earlier prediction. The revised projection indicates a slight growth of 5.9% compared to 2019 total POM.

Breaking this down, Table 4 shows that almost all categories are projected to experience various levels of growth in sales in 2020 apart from two: Monitoring and Control Instruments, and Gas Discharge Lamps and LED Light Sources. Model estimates for these two categories are more variable due to variations and gaps in historic reporting data.

A producer survey was carried out and responses were compiled in July. While the responses were limited (gaining only four responses in total), most of these indicated an increase in EEE sales since lockdown. Two responses indicated growth of 40% and 65% respectively for the category of Toys, Leisure and Sports. The full response is summarised in the Appendix. The responses also indicated an increase in sales from both online and in-store retail channels, and that EEE sales are expected to return to pre-lockdown levels by August or September.

Two online sales and reuse platforms that contributed data to this research also indicated a dip in activity during the beginning of the lockdown, followed by a surge in demand and supply across various electronics categories. Product categories including video games, computers and telecoms equipment saw strong growth in sales ranging from 19% to 113% in Q2 compared to Q1 2020.[12] This is consistent with growth in POM data for these categories shown in Table 4.

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[12] Commercial data from personal communication

Table 4 Breakdown of estimated household EEE POM by category in 2020, in comparison to 2019 reporting

	(W)EEE Category	Estimated Household POM tonnes, 2020	Actual Household POM tonnes, 2019	Estimated growth % (2020 vs 2019)
1	Large Household Appliances (A)	600,212	600,139	0.01
2	Small Household Appliances (E)	169,671	158,391	7.1
3	IT and Telecoms Equipment (E)	82,444	78,097	5.6
4	Consumer Equipment (E)	41,392	38,303	8.1
5	Lighting Equipment (E)	56,150	55,238	1.7
6	Electrical and Electronic Tools (E)	72,989	68,520	6.5
7	Toys Leisure and Sports (E)	66,694	53,070	25.7
8	Medical Devices (E)	4,259	3,140	35.6
9	Monitoring and Control Instruments (E)	18,169	19,558	-7.1
10	Automatic Dispensers (E)	139	77	80.5
11	Display Equipment (C)	105,631	86,742	21.8
12	Cooling Appliances Containing Refrigerants (B)	230,653	214,495	7.5
13	Gas Discharge Lamps and LED Light Sources (D)	6,375	8,408	-24.2
14	Photovoltaic Panels (F)	40,642	27,608	47.2
	Total	**1,495,419**	**1,411,784**	**5.9**

5.2.2 Forecast impact of the pandemic on UK WEEE arising

Based on reported household EEE POM dating back to 2010, our modelling, combined with the EU tool, estimates the 2020 national WEEE arising to be 1,382,137 tonnes. This represents a slight decrease of 1.4% compared to 2019 using the same model assumptions about average EEE lifetime by product type.

As shown in Table 5, changes in WEEE arising by category are mostly within 9% compared to 2019. Lighting equipment, Automatic dispensers and Photovoltaic panels are obvious outliers again due to uncertainties from POM data.

Due to differences in purchase patterns, use and disposal patterns and average lifetime of products, EEE does not come off the market on a like-for-like basis.[1] Therefore, WEEE arising in 2020 is largely influenced by EEE sales and usage patterns from previous years. Similarly, sales trends in 2020 previously presented in Table 4 will influence future WEEE composition. This has further ramifications on infrastructure and

costs associated with collection and processing. For example, the growing sales of small mixed EEE products in 2020 may support the case for ongoing efforts for targeted awareness campaigns for this type of WEEE and improving HWRC operations to prevent them from being lost to residual waste.

Table 5 Growth in estimated total arisings relative to total arisings in 2019

WEEE Category		Estimated total arisings 2020 (tonnes)	Estimated total arisings 2019 (tonnes)	Percentage growth in arisings (2020 vs 2019)
a	Large domestic appliances (LDAs) other than cooling appliances	390,698	385,412	1.4
b	Cooling appliances containing refrigerants	297,417	296,040	0.5
c	Display equipment containing cathode ray tubes (CRTs)	127,496	133,204	-4.3
d	Gas discharge lamp incl LEDs (light emitting diodes)	42,341	44,932	-5.8
e	All other WEEE; Small mixed WEEE (SMW)	523,451	541,024	-3.2
f	Photovoltaic panels (solar panels)	734	459	59.9
Total		**1,382,137**	**1,401,070**	**-1.4**

5.2.3 Forecast impact of the pandemic on WEEE collection and processing

The COVID-19 Impacts model estimates that of the 1,382,137 tonnes of national WEEE arising, a total of 330,711 tonnes of WEEE would be 'available for collection' - this represents the amount of WEEE that would have been presented for collection via HWRC and bulky kerbside in a BAU scenario. To break this down, 232,294 tonnes of WEEE are projected to be available for collection via HWRCs, and another 98,418 tonnes via bulky kerbside collections.

As a result of the HWRC and bulky kerbside collection model components, a total of 91,477 tonnes of WEEE is forecasted as inaccessible to DCF collection channels, 78,834 tonnes of which were from HWRCs and 12,643 tonnes from bulky kerbside collections. Due to the LA focus of the model and a lack of primary data, it was assumed that Regulation 43 and Regulation 50 collections resumed unabated over the course of the lockdown. The producer survey response was also not able to capture a

wider trend of reduced Regulation 43 and Regulation 50 collections, due to the limited number of responses. Therefore, it was deemed appropriate for the modelled actual Regulation 43 and Regulation 50 collections to be equal to the modelled WEEE available for collection from Q2-Q4 2020. The impact of this assumption can be viewed in Figure 1 and Figure 2, in which Regulation 43 collections appear to have been underestimated by roughly 9,455 tonnes, whereas Regulation 50 collections appear to have been overestimated by 7,486 tonnes across the year. A breakdown of the total modelled arisings and collections per stream can be viewed in Figure 8.

Figure 8 Modelled WEEE available for collection and modelled actual collections in 2020
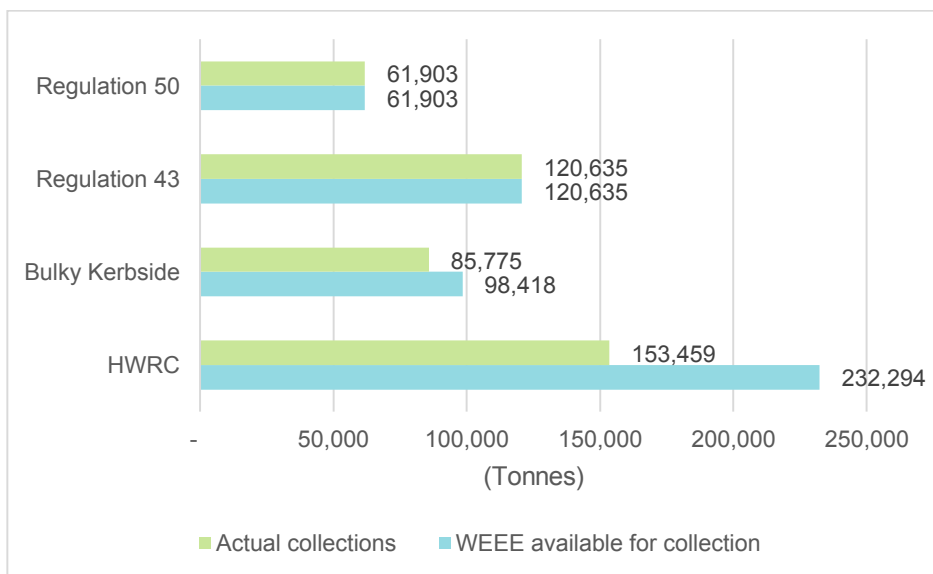
Within the two collection channels that were subject to modulation in our scenario (HWRC and bulky kerbside collections), several WEEE categories are more prevalent as a proportion of national arisings and make up a greater proportion of the tonnage of WEEE inaccessible to DCF collection channels. As can be viewed in Table 5, certain categories such as Consumer equipment, Cooling appliances containing refrigerants and Display equipment are over-represented in the HWRC and bulky kerbside arisings for collection.

Table 11 and Table 12 show a breakdown of the modelled tonnages inaccessible to HWRC and bulky kerbside collections. From these it can be observed that Large domestic appliances, Small household appliances, Consumer equipment, Display equipment and Cooling appliances containing refrigerants contribute the largest proportions of the inaccessible collections throughout 2020 (see Table 6).

Of these, Large domestic appliances and Cooling appliances containing refrigerants have by far the largest quantity of inaccessible collections. This can be partly explained by the fact that these categories comprise the vast majority of BAU bulky kerbside collections (40,355 tonnes and 41,550 tonnes respectively) and therefore also account for the majority of inaccessible bulky kerbside collections (5,223 and 5,344 tonnes respectively). But this does not account for all cases. The large proportion of inaccessible collections are the results of restricted HWRC collection capabilities as modelled via the HWRC collection model component. This model component was informed chiefly by the Environment Agency's reported collections from Q2 2020, which indicated that the drop in collections relative to our BAU case was much greater than average for these two categories and this is reflected in the inaccessible HWRC collections for the entire year (see Table 6). This was also consistent with our survey responses from 17 LAs.

On the other hand, AATF survey responses and stakeholder feedback indicated that operations had made a near-full recovery during June and July and are well-equipped to handle potential surges in intake. For some WEEE categories such as Cooling appliances, intake has historically been seasonal with spikes in summertime. Correspondence with industry operators also indicated that there was a surge in the collection of Cooling appliances containing refrigerants in July and August as the first lockdown came to an end.

Table 6 Modelled WEEE inaccessible to DCF (HWRC and bulky kerbside) collections by category 2020 (tonnes)

	WEEE Category	HWRC	Bulky kerbside	DCF (HWRC+Bulky kerbside)
a	LDAs other than cooling appliances	23,401	5,223	28,623
b	Cooling appliances containing refrigerants	18,132	5,344	23,475
c	Display equipment containing CRT	7,976	1,393	9,369
d	Gas discharge lamp incl LEDs	229	2	231
e	All other WEEE; (SMW)	28,823	667	29,490
f	Photovoltaic panels (solar panels)	273	15	288
	Total	**78,834**	**12,643**	**91,477**

As can be viewed in Table 7, generally the modelled scenario underestimated the tonnages collected throughout Q3 2020 by between 20-35%.[13] There are two potential explanations for this discrepancy between the COVID-19 Impacts model and the reported data. Either there was a surge in the disposal of all WEEE streams following the end of the first lockdown that was not accounted for within the model, or there was an underestimation of the rate at which collection services would resume near-BAU operations. Given the relative uniformity of error rates across most categories, the latter is the more likely explanation, but it is difficult to discern the reason for this discrepancy without further input from LAs. Apart from these scenario discrepancies, other sources of error have been explained in the methodology section of this report.

Lastly, due to a focus on DCF collection channels, the pandemic scenarios for Regulation 43 and Regulation 50 were not built into the model. The data reported by the Environment Agency for Regulation 43 and Regulation 50 indicates that the assumption of negligible impact on these collection streams was not sound. As can be seen in Table 9 and Table 10 in the Appendix, the proportion of WEEE collected via these streams has varied significantly in Q1-Q3 between 2019 and 2020. Although it is not possible to know the exact cause of these fluctuations, one potential explanation could be the varying levels of lockdown and definitions of 'essential' businesses over the course of the lockdown.

Table 7 Modelled 'actual collections' from a DCF in Q3 2020 vs collections in Q3 2020 as reported by the EA

WEEE Category		Q3 Modelled actual collections (tonnes)	Reported Q3 collections (tonnes)	Error (%)
a	LDAs other than cooling appliances	16,922	20,777	-19%
b	Cooling appliances containing refrigerants	17,797	22,085	-19%
c	Display equipment containing CRTs	6,350	9,733	-35%
d	Gas discharge lamp incl LEDs	133	189	-30%
e	All other WEEE; (SMW)	18,301	28,077	-35%
f	Photovoltaic panels (solar panels)	99	57	73%
	Total	**59,602**	**80,919**	**-26%**

6. Conclusion and recommendations

Based on the results of the modelled scenario, bulky items have been the most affected by the disruptions of the first national lockdown. Large domestic appliances, Display equipment and Cooling appliances containing refrigerants have the highest estimates of tonnages inaccessible to DCF channels. Whilst it is likely that some of these items remained in people's homes until HWRCs re-opened or bulky collection service resumed, there is also the possibility that householders instead used non-council waste collection services and, as a result, these collection and recycling tonnages may not have been channelled to AATFs and additionally may not be reported towards the UK target. Moving forward, these WEEE categories should be the priority for HWRCs and waste management companies in terms of communication for proper disposal, coordination to ensure accessibility of services, and planning to ensure sufficient resources are in place to handle potential surges.

During the first national lockdown, there was little warning and guidance before the government mandated recycling centres to close. Stakeholder engagement and survey results show that, despite mixed messages and a lack of unified approach, Local Authorities generally prioritised services and reconfigured as fast as possible, e.g. by arranging for additional capacity where needed and putting in place appropriate measures upon re-opening. This study therefore focused on the impact of the lockdown on WEEE collections compared to a BAU scenario.

Although not directly investigated during this study, anecdotal evidence suggested that householders now tend to maximise the amount of WEEE they offload to HWRCs on each trip, since securing a time slot is now more complicated with measures such as booking systems in place. This change to previous practices presents an opportunity to interact with householders ahead of time. Booking systems could be used as a platform for education and nudging responsible disposal behaviour. For instance, booking systems may prompt users to gather small WEEE currently hoarded in the household. Given the overall increase in POM this year, consumer engagement and education will continue to be crucial in minimising the loss of small WEEE items.

7. Appendix

7.1   Supplementary tables and figures

Table 8 HWRC collection scenario (1-12 corresponding to January – December 2020)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Large Household Appliances (A)	100%	100%	100%	5%	5%	5%	17%	30%	95%	95%	95%	95%
Small Household Appliances (E)	100%	100%	100%	35%	35%	35%	43%	52%	95%	95%	95%	95%
IT and Telecoms Equipment (E)	100%	100%	100%	41%	41%	41%	49%	57%	95%	95%	95%	95%
Consumer Equipment (E)	100%	100%	100%	39%	39%	39%	47%	55%	95%	95%	95%	95%
Lighting Equipment (E)	100%	100%	100%	36%	36%	36%	44%	53%	95%	95%	95%	95%
Electrical and Electronic Tools (E)	100%	100%	100%	29%	29%	29%	38%	48%	95%	95%	95%	95%
Toys Leisure and Sports (E)	100%	100%	100%	30%	30%	30%	39%	49%	95%	95%	95%	95%
Medical Devices (E)	100%	100%	100%	0%	0%	0%	14%	27%	95%	95%	95%	95%
Monitoring and Control Instruments (E)	100%	100%	100%	33%	33%	33%	42%	51%	95%	95%	95%	95%
Automatic Dispensers (E)	100%	100%	100%	0%	0%	0%	14%	27%	95%	95%	95%	95%
Display Equipment (C)	100%	100%	100%	23%	23%	23%	33%	44%	95%	95%	95%	95%
Cooling Appliances Containing Refrigerants (B)	100%	100%	100%	12%	12%	12%	24%	35%	95%	95%	95%	95%
Gas Discharge Lamps and LED Light Sources (D)	100%	100%	100%	35%	35%	35%	43%	52%	95%	95%	95%	95%
Photovoltaic Panels (F)	100%	100%	100%	0%	0%	0%	14%	27%	95%	95%	95%	95%

Table 9 Percentage change 2019-2020 in Environment Agency reported Regulation 43 collections from households,

WEEE Category		Q1	Q2	Q3
a	Large domestic appliances other than cooling appliances	11%	-14%	19%
b	Cooling appliances containing refrigerants	7%	-2%	19%
c	Display equipment containing CRTs	-6%	-35%	26%
d	Gas discharge lamp incl LEDs	-14%	-61%	-12%
e	All other WEEE; (SMW)	20%	-33%	-21%
f	Photovoltaic panels (Solar Panels)	-96%	-85%	2771%
	Total	**10%**	**-11%**	**18%**

Table 10 Percentage change 2019-2020 in Environment Agency reported Regulation 50 collections from households,

WEEE Category		Q1	Q2	Q3
a	Large domestic appliances other than cooling appliances	229%	4%	-10%
b	Cooling appliances containing refrigerants	8%	-35%	-2%
c	Display equipment containing CRTs	-26%	-69%	-52%
d	Gas discharge lamp incl LEDs	0%	-59%	-20%
e	All other WEEE; (SMW)	-10%	-53%	-32%
f	Photovoltaic panels (Solar Panels)	30%	2337%	104%
	Total	**55%**	**-38%**	**-22%**

Table 11 Modelled HWRC inaccessible collections relative to BAU scenario by quarter 2020 (tonnes)

WEEE Category		Q1	Q2	Q3	Q4
a	Large domestic appliances other than cooling appliances	-	14,867	7,839	695
b	Cooling appliances containing refrigerants	-	11,080	6,495	556
c	Display equipment containing cathode ray tubes	-	4,966	2,727	284
d	Gas discharge lamp incl LEDs	-	144	75	10
e	All other WEEE; (SMW)	-	18,038	9,708	1,076
f	Photovoltaic panels (Solar Panels)	-	178	88	7
	Total	**-**	**49,274**	**26,932**	**2,629**

Table 12 Modelled inaccessible bulky kerbside collections relative to BAU scenario by quarter 2020 (tonnes)

| WEEE Category		Q1	Q2	Q3	Q4
a	Large domestic appliances other than cooling appliances	-	4,070	730	423
b	Cooling appliances containing refrigerants	-	4,104	815	425
c	Display equipment containing cathode ray tubes	-	1,082	200	111
d	Gas discharge lamp incl LEDs	-	1	0	0
e	All other WEEE; (SMW)	-	526	94	47
f	Photovoltaic panels (Solar Panels)	-	12	2	1
	Total	**-**	**9,794**	**1,841**	**1,007**

Figure 9 Modelled HWRC and bulky kerbside WEEE available for collection in 2020 as a proportion of EU tool estimated total national arisings
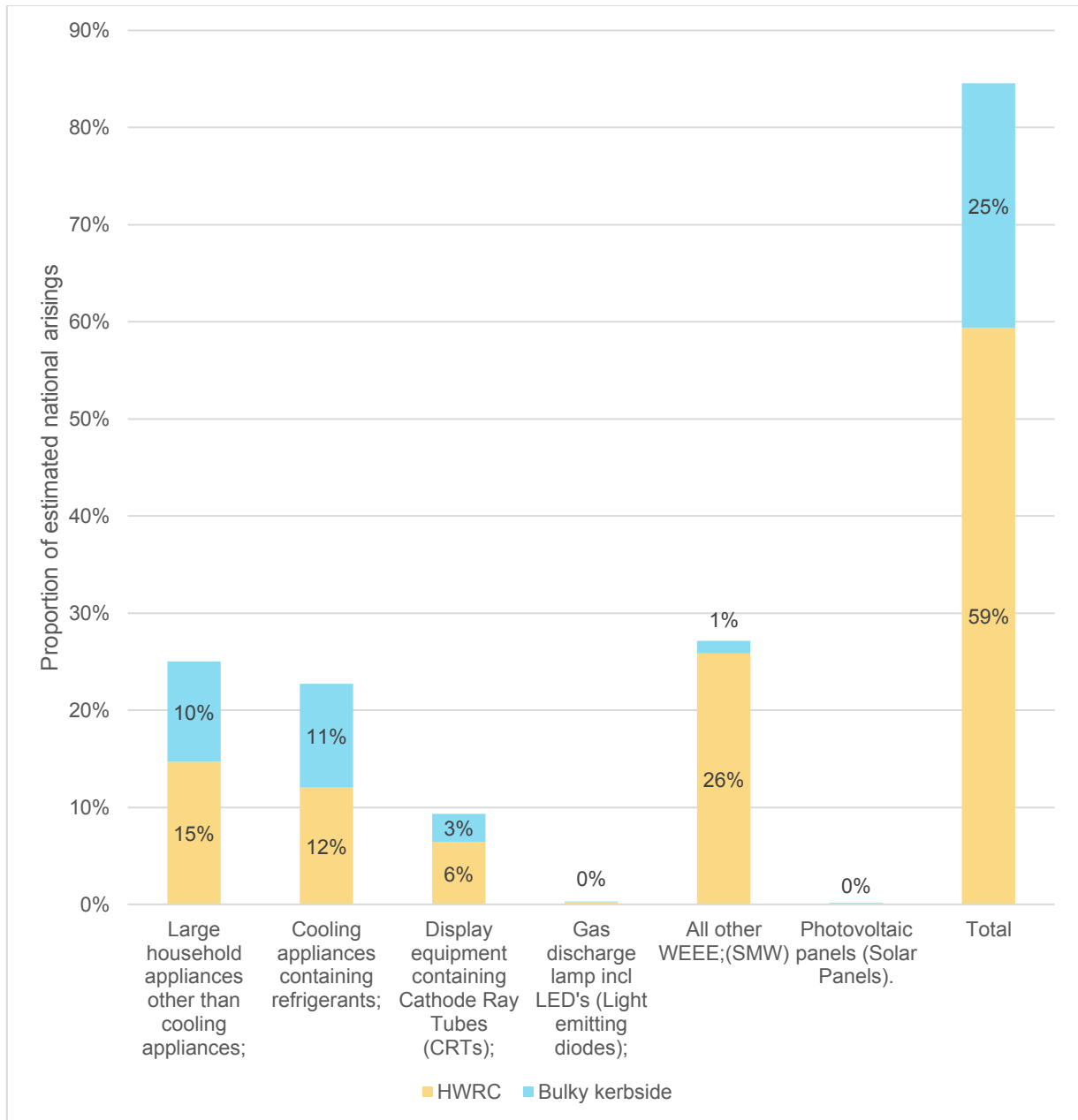
7.2 Summary of survey responses

Please note that throughout the survey response summary presented below, 'n' designates the number of responses per question.

7.2.1 Producer/ Retailer Survey Responses

Question 1: To what extent have you seen the quantity of EEE you have sold in the UK increase/decrease as a % since lockdown compared to normal i.e. before lockdown, please specify by EEE category (n=4)

Response: In total there were ten indications of an increase in EEE sales, across eight categories. The strongest growth was seen in Toys, Leisure & Sport which had two responses indicating 40-65% growth. There were four indications in total of a decrease in EEE sales across four categories. The magnitude in these decreases vary between 5-35%, although it is notable that all of these responses came from one retailer.

	Number of responses indicating 'Increase' (Selected range of percentage increase)	Number of responses indicating 'Decrease' (Selected range of percentage decrease)
1 - Large Household Appliances	1 (20%)	0
2 - Small Household Appliances	1 (20%)	1 (5%)
3 - IT and Telecomms Equipment	0	1 (35%)
4 - Consumer Equipment	1 (20%)	1 (5%)
5 - Lighting Equipment	1 (5%)	0
6 - Electrical and Electronic Tools	1 (35%)	0
7 - Toys Leisure and Sports	2 (40%, 65%)	1 (15%)
8 - Medical Devices	0	0
9 - Monitoring and Control Instruments	0	0
10 - Automatic Dispensers	0	0
11 - Display Equipment	2 (25%, 70%)	0
12 - Cooling Appliances Containing Refrigerants	0	0
13 - Gas Discharge Lamps and LED Light Sources	1 (10%)	0
14 - Photovoltaic Panels	0	0

Question 2: How have sales changed by different sales channels and how has this been also affected by changes in promotional activity from those that were planned to take place prior to lockdown. (n=3)

Response: The responses strongly indicate an increase in sales from both online and in-store retail channels across five EEE categories. These being, Large Household Appliances, Small Household Appliances, Consumer Equipment, Display Equipment and Toys, Leisure & Sports.

	Sales from Online	Sales from Retail locations	Sales from Both	Level Promotional Activity
1 - Large Household Appliances	No change	No change	Increase: 1	No change
2 - Small Household Appliances	Increase: 1 Decrease: 1	No change	Increase: 1	N/A: 1
3 - IT and Telecomms Equipment	No change	No change	No change	No change
4 - Consumer Equipment	No change	No change	Increase: 1	No change
5 - Lighting Equipment	No change	No change	No change	No change
6 - Electrical and Electronic Tools	No change	No change	No change	No change
7 - Toys Leisure and Sports	Increase: 1	Increase: 1	Increase: 2	No change
8 - Medical Devices	No change	No change	No change	No change
9 - Monitoring and Control Instruments	No change	No change	No change	No change
10 - Automatic Dispensers	No change	No change	No change	No change
11 - Display Equipment	No change	No change	Increase: 1	No change
12 - Cooling Appliances Containing Refrigerants	No change	No change	No change	No change
13 - Gas Discharge Lamps and LED Light Sources	No change	No change	No change	No change
14 - Photovoltaic Panels	No change	No change	No change	No change

Question 3: How long do you think it will take in months for your EEE sales to return to normal (pre-lockdown levels) from today? (n=3)

Response: For most categories, the respondents estimate that it will take between 1-2 months for EEE sales to return to normal. None of the responses estimated a recovery period longer than 12 months.

Months for EEE sales to return to normal	1	2	3	4	5	6	7	8	9	10	11	12
1 - Large Household Appliances	0	0	0	0	0	0	0	0	0	0	0	0
2 - Small Household Appliances	0	1	0	0	0	0	0	1	1	1	1	1
3 - IT and Telecomms Equipment	0	1	0	0	0	0	0	0	0	0	0	0
4 - Consumer Equipment	0	1	0	0	0	0	0	0	0	0	0	0
5 - Lighting Equipment	1	0	0	0	0	0	0	0	0	0	0	0
6 - Electrical and Electronic Tools	0	1	0	0	0	0	0	0	0	0	0	0
7 - Toys Leisure and Sports	1	0	0	0	0	1	0	0	0	0	0	0
8 - Medical Devices	0	0	0	0	0	0	0	0	0	0	0	0
9 - Monitoring and Control Instruments	0	0	0	0	0	0	0	0	0	0	0	0
10 - Automatic Dispensers	0	0	0	0	0	0	0	0	0	0	0	0
11 - Display Equipment	1	0	0	0	0	0	0	0	0	0	0	0
12 - Cooling Appliances Containing Refrigerants	0	0	0	0	0	0	0	0	0	0	0	0
13 - Gas Discharge Lamps and LED Light Sources	1	0	0	0	0	0	0	0	0	0	0	0
14 - Photovoltaic Panels	0	0	0	0	0	0	0	0	0	0	0	0

Question 4: have you seen a change in the volume (quantity) of product returns that would have been expected by pre-lockdown levels? (n=4)

Response: Results show mixed picture for the number of returns across the categories of Small Household Equipment, IT & Telecoms Equipment and Consumer Equipment. This is largely due to low response rate, with two producers contributing to these differences i.e. one indicated growth and one indicated a decline). One respondent also commented "*We have seen more commercial returns, because deliveries could not be received to the shops because of lockdown. So, delivery was sent back to us*."

	Percentage decrease							Percent increase						
	50-100	25-50	15-25	10-15	5-10	0-5	0	0-5	5-10	10-15	15-25	25-50	50-100	>100
1 - Large Domestic Appliances	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 - Small Household Appliances	0	0	0	0	0	0	0	0	1	0	0	0	0	0
3 - IT and Telecoms Equipment	0	0	0	0	1	1	0	0	1	0	0	0	0	0
4 - Consumer Equipment	0	0	1	0	0	0	0	0	0	0	0	0	0	0
5 - Lighting Equipment	0	0	0	1	0	0	0	0	1	0	0	0	0	0
6 - Electrical and Electronic Tools	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Toys Leisure and Sports	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8 - Medical Devices	0	0	0	0	0	1	0	0	2	0	0	0	0	0
9 - Monitoring and Control Instruments	0	0	0	0	0	0	0	0	0	0	0	0	0	0

10 - Automatic Dispensers	0	0	0	0	0	0	0	1	0	0	0	0	0	0
11 - Display Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 - Cooling Appliances Containing Refrigerants	0	0	0	0	0	0	1	0	1	0	0	0	0	0
13 - Gas Discharge Lamps and LED Light Sources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 - Photovoltaic Panels	0	0	0	0	0	0	1	0	0	0	0	0	0	0

Question 5: How could the management of the lockdown be better implemented next time? (n=1)

Response: One respondent commented "*Some retailers closed before they were able to move stock to enable them to sell and move goods via their online channel. This exacerbated a supply and demand issue regarding stock availability, especially as there are also freight import challenges globally as a result of Covid-19. Waste disposal companies and household recycling centres were closed with no alternatives or guidance on what consumers should do. This has likely increased fly tipping, items being thrown in household waste, stockpiled posing hazardous risks.*"

7.2.2 AATF Survey Responses

Question 1: To what extent have you seen the flow of WEEE into your site change since HWRCs reopened as a % compared to normal i.e. before lockdown (n=9)

Response: Most respondents see a 20-90% decrease across WEEE categories, though some sites have indicated increased flow

	Percent decrease											Percent increase									
	100	90	80	70	60	50	40	30	20	10	0	10	20	30	40	50	60	70	80	90	100
A - large domestic appliances	0	1	0	1	0	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0
B - cooling equipment	0	0	1	0	0	1	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0
C - display equipment	0	2	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
D - lamps	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
E - all other WEE	0	2	0	0	0	1	0	2	0	0	0	1	0	0	0	1	0	0	0	0	0

Question 2: Looking at the Alert Level table, at what level do you expect the flow of WEEE to your site to return to normal i.e. to pre-lockdown levels? (at time of survey the UK was at level 4) (n=9)

Response: Limited supply expected to continue despite easing of lock down in July (then at Level 3)

Alert Level	5	4	3	2	1
Number of responses	1	0	1	6	1

Question 3: How long after your sites reopen and access returns to normal do you think it will take for WEEE levels received to return to pre-lockdown levels? (n=9)

Response: Respondents expect up to a year-long disruption to WEEE supply after reopening

	Months from lockdown to return to normal levels of WEEE being received on site											
	1	2	3	4	5	6	7	8	9	10	11	12
A - large domestic appliances	0	1	1	1	1	1	0	0	1	0	0	0
B - cooling equipment	1	0	3	2	0	0	0	0	1	0	0	0
C - display equipment	0	0	3	0	0	1	0	0	1	0	0	0
D - lamps	1	0	1	0	0	0	0	0	2	0	0	0
E - all other WEE	0	0	3	1	0	1	0	0	1	0	0	1

Question 4: Are you expecting to see a surge in WEEE flow into your sites when site access restrictions are lifted and if so, by how much and how long that will surge last for? (n=9)

Response: Categories A,B,C are highlighted as sources of potential short-term surges. Three responses indicated 'no surged expected'. One respondent commented '*All councils are opening on different terms so councils accepting Category E are seeing high levels, but some are not accepting Category A and B*'; the response also noted the concern that some Category E WEEE may be lost in councils that are only accepting general waste. None of the responses estimated a surge period longer than 2 month or a surge beyond 50% than normal when site access restrictions are lifted.

	Up to 1 week	1-2 weeks	2-4 weeks	1-2 months
0-10%		Category A: 1 Category E: 1		
10-20%	Category E: 1		Category A: 1 Category B: 1	Category C: 1
20-30%		Category E: 1		Category B: 1
30-50%		Category C: 1	Category A: 1 Category B: 3 Category D: 1 Category E: 1	

Question 5: Do you expect to have storage enough capacity on site for any expected increased quantity of WEEE being received on site (n=9)

Response: Most respondents do not see storage capacity as an issue. Only one response indicated not enough storage capacity on site and indicated that 25% extra storage capacity is needed to handle the increased quantity of WEEE that may be received.

	Yes	No	N/A
A - large domestic appliances	4	1	2
B - cooling equipment	6	0	1
C - display equipment	4	0	2
D - lamps	3	0	2
E - all other WEEE	6	0	2

Question 6: Do you expect to have enough processing capacity on site for any expected increased quantity of WEEE being received on site (n=9)

Response: Most respondents don't see processing capacity as an issue. One response noted that an additional shift had been put in place but there was still extra capacity (with a nightshift handling 200 tonnes max per day, some short-term strain expected).

	Yes	No	N/A
A - large domestic appliances	5	1	0
B - cooling equipment	7	0	0
C - display equipment	4	0	1
D - lamps	3	0	1
E - all other WEEE	6	0	1

Question 7: How do/did you plan to manage the increased WEEE being received on your site since HWRCs first reopened? (n=9)

Response: Most respondents expect no change upon reopening of HWRCs. One respondent specified that the AATF has possible additional storage from other feed sites for Category E.

	No change	Limiting flow material into site	Increasing quantity of WEEE stored on site	Increasing processing line operating time	Increasing processing capacity at site	Increase lead time for treating material (**please specify in months**)	Other
A - large domestic appliances	3	1	0	0	1	0	1
B - cooling equipment	3	1	2	2	0	0	1
C - display equipment	2	0	0	3	1	0	0
D - lamps	3	0	0	0	0	0	0
E - all other WEEE	2	0	1	3	2	0	0

Question 8: Do you expect that your end markets will have enough capacity for the increased material flowing into your site and subsequently the increased output materials from your site (n=9)

Response: Most respondents expect that there will be sufficient end markets for increased throughput – except for plastics and select waste streams such as compressors and displays. Below are some specific comments made:
- *Capacity: not the limiting factor.*
- *Price: very reduced and volatile prices*
- *Plastics: more problematic than other WEEE material streams. Low demand despite signs of slow recovery; downstream and shipping restrictions can cause back log of some materials (e.g. polystyrene)*
- *PCBs: 1 response noted outlets have remained open*
- *Other – compressors: 1 response noted limited export due to shipping restrictions; 1 response noted limited availability of containers due to reduced trade activity from China*
- *Other – displays: 1 response noted no downstream available (supply is currently stored)*
- *Uncertain market outlook: 1 response noted the long-term uncertainty due to POPs, Brexit, Norwegian Proposal and effects of COVID-19*

	Yes	No	N/A
Steel	7	0	1
Aluminium	7	0	1
Copper	7	0	1
Other Metals (Please specify):	2	0	0
	0	0	0
Plastics	4	2	1
Printed Circuit Boards (PCBs)	5	0	0
Critical Raw Materials	0	0	3
Other (Please specify):	0	1	0
	0	0	0
Other (Please specify):	0	1	0
	0	0	0

Question 9: How could the management of a lockdown be better implemented next time in respect to WEEE collections locally and nationally? (n=9)

Response: Specific comments are summarised by theme as presented below.

Collection and supply
- Management of collections from a DCF or HWRC sites, should potentially be considered as an essential activity and a consistent flow of WEEE is needed
- Keep HWRC / DCF sites open , with all Covid isolation systems in place, but with additional funding to implement these systems being made available via the WEEE compliance fund)
- Keep the HWRCs open but on reduced hours to keep up a steady flow rather than peaks and troughs.
- A national approach to collection would be beneficial
- Coordination: HWRCs shut at different times which necessitates more coordination; a central re-open date would be beneficial
- Clarity: Need to agree on how to re-open. For example, some sites are accepting SDA but not LDA/Cooling; collection should open to all streams to minimize SDA ending up in black bags.

Operations (from one respondent)
- Most of our sites opened for non-WEEE material for the first 2 weeks. This was a mistake.
- Allow more than one person in the car. As site attendants are not able to assist with bulky items it can be difficult to deposit.
- We are receiving cooling, however, there is a greater number of under bench units due to the reasons above.
- Communication flow from LA to public has not been great.

Management (from one respondent)
- Provide surety of contract – i.e. stop PCS's from using lockdown as an opportunity to beat prices down due to spare capacity in the processing sector
- Provide centralised enforcement agency questionnaires in a standard format
- Provide clear definition of Key Worker status of operatives working in the industry which can be used by parents to ensure children can continue to attend school
- Another respondent reflected:
- Working in partnership with Local Authority contracts and PCS enabled us to plan and make the appropriate decisions at the right time, balanced with site service.

Question 10: What support / resources would help you manage the flow of WEEE better on site in the future if lockdown is implemented again? (n=9)
Response: Specific comments are summarised by theme as presented below.
Financial
- Additional funding via the WEEE compliance fund to implement safe systems of work at the DCF/HWRC sites
- Funding for purchase or rent of temporary storage of UN processed materials arising at the HWRC if the AATF was unable to accept or treat
- Similar to the temporary storage provided when the fridge gas / ODS legislation came in in 2002. i.e. keeping the HWRC sites open but organise additional temporary storage, funded by the WEEE CF, without changing the original intended destination AATF but assisting them in processing time)
- One respondent had no issues with accepting or collecting contractual requirements but can potentially see an issue in export of WEEE derived materials due to limited availability of shipping freight options
- No financial assistance has been received from the Environment Agency or the PCS's or Defra.
- Financial support needed while the site is non-operational, to help pay the staff kept on site to fire watch and cover loss of revenue

Operations
- Consistency: HWRCs to continue operating and accepting all streams as normal and not close but perhaps with measures in place such as pre booking slots
- Redirection: Direct the public to large HWRCs with storage to avoid the smaller sites being overwhelmed
- Efficiency: Having material collected in Ro-ro [roll on roll off] containers saves time and resources
- Additional storage: Most site managers wanted collections to occur prior to site opening. This is not possible to achieve with everyone and the sites must have some contingency for storage of overflow.
- Coordination: Clarity on forecast volumes and a list of WDAs, length of lockdown, next re-opening dates etc. This would speed up communication; avoid drastic changes to WEEE system

Management
- Support is need from the Environment Agency if an AATF needs to license another site in the short term: the current process is not efficient, a separate help line at the EA to handle issues arising at AATFs would be beneficial
- More flexibility to furlough staff on and off without 3-week minimum claim period

7.2.3 Local Authority Survey

The geographic spread of respondents is summarised below:
- North East England: 6
- North West England: 1
- South West England: 4
- South East England: 1
- West Midlands: 1
- Scotland: 4

Question 1: To what extent have you seen the collection of WEEE change since you reopened your HWRCs as a % compared to normal i.e. before lockdown, please specify by WEEE category: (n=11)

Response: Nearly 70% of respondents report a decline in WEEE flow, with most reporting a decrease of between 50% to 100%. One respondent noted that anecdotally from the council's contractor, tonnage across sites may be down to around 50% of normal.

	Percent decrease											Percent increase									
	100	90	80	70	60	50	40	30	20	10	0	10	20	30	40	50	60	70	80	90	100
A - large domestic appliances	2	0	0	0	1	3	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0
B - cooling equipment	1	0	1	1	0	3	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0
C - display equipment	2	0	0	0	2	2	0	1	0	0	2	1	0	0	0	0	0	0	0	0	0
D - lamps	3	0	0	0	0	3	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0
E - all other WEEE	1	0	0	0	1	2	1	2	0	0	2	1	0	0	0	0	0	0	0	0	0

Question 2: Looking at the Alert Level table, at what alert level do you expect the sites to return to normal i.e. collect all WEEE streams to pre-lockdown levels and the HWRCs operating as (at time of survey the UK was at level 4) (n=17)

Response: Most respondents expect a limited supply until the UK reaches Level 2 (COVID-19 is present in the UK but the number of cases and transmission is low).

Alert Level	5	4	3	2	1
Number of responses	0	2	3	10	2

Question 3: How long after your sites reopen and access returns to normal do you think it will take for WEEE levels received to return to pre-lockdown levels? (n=17)

Response: Across all WEEE streams, around 63% of respondents expect the levels being received to bounce back within six months of lockdown and 90% of respondents think this will occur within 12 months. No responses estimated a recovery period of longer than 12 months. One respondent commented that "*Increased social distancing measures required on-site means reduced throughput of vehicles and – as a result – reduced tonnages across all materials streams including WEEE. Efforts are being made to try to increase capacity where it is safe to do so.*"

	Months from lockdown to return to normal levels of WEEE being received on site												
	1	2	3	4	5	6	7	8	9	10	11	12	Other
A - large domestic appliances	5	2	0	1	0	3	0	1	0	0	0	3	2
B - cooling equipment	5	2	0	1	0	3	0	1	0	0	0	3	1
C - display equipment	4	2	2	0	0	3	0	1	0	0	0	3	1
D - lamps	4	3	1	0	0	3	0	1	0	0	0	3	1
E - all other WEEE	4	3	1	0	0	3	0	1	0	0	0	3	1

Question 4: Are you expecting to see a surge in WEEE flow into your sites when site access restrictions are lifted and if so, by how much and how long that will surge last for? (n=17)

Response: All categories are mentioned as sources of potential short-term surges between 1 week to 2 months. Four respondents selected 'no surges' for all categories; one respondent specified 'no surges' for Category D only. Of those that specified expected surges, no responses selected a surge period longer than 2 months. One respondent commented that "*a relatively modest surge is expected because all sites were reopened with all materials (except non-household types: soil, hardcore, asbestos, plasterboard and tyres) including WEEE being accepted. Capacity at sites is reduced though so some residual backlog across all WEEE types is expected, since waste collection authority's bulky waste collection services were disrupted during lockdown and there may be more large household appliances that could arrive at Household Waste Recycling Sites (HWRSs)*".

	Up to 1 week	1-2 weeks	2-4 weeks	1-2 months
0-10%	Category E: 1	Category A: 1 Category B: 1 Category C: 1 Category D: 2 Category E: 1	Category D: 3	Category A: 4 Category B: 4 Category C: 3 Category E: 3
10-20%		Category A: 1 Category B: 1 Category C: 1 Category D: 2 Category E: 1	Category A: 2 Category B: 2 Category C: 2 Category D: 2 Category E: 3	Category B: 2 Category C: 2 Category D: 2 Category E: 2
20-30%	0	0	0	0
30-50%	0	Category C: 1	0	Category A: 2
50-75%	0	0	Category A: 1 Category B: 1	Category A: 1 Category B: 1 Category C: 1 Category E: 1
75-100%	0	0	0	0
100-200%	0	0	0	0
More than 200%	0	0	0	0

Question 5: Do you have enough capacity on site for the increased quantity of WEEE being received on site (n=18)

Response: Most respondents do not consider storage capacity as an issue. Of the 4 responses that indicated not enough capacity on site, 1 required 10% extra capacity for all streams, 1 indicated 25%

extra capacity for Category B, and 3 indicated 20% extra capacity for Category E. No responses indicated need for more than 25% extra capacity.

	Yes	No	N/A
Number of responses	14	4	0

Question 6: How do you plan to manage (or how have you managed) the increased WEEE being received on your HWRCs when (since) the sites have opened? (n=17)

Response: Most respondents plan to or did limit the number of people allowed on the site as a means of managing the increased flow of WEEE. One response indicated that "*During June, the HWRS network was running at about 60% of its normal throughput. This is expected to drop in July and further still in August as these months are traditionally busier and the sites are currently practically at full capacity. Efforts are being made to try to open up more vehicle bays if it possible to do so.*"

	No change	Limiting flow of traffic / public being allowed on site	Increased collections
A - large domestic appliances	3	13	4
B - cooling equipment	3	13	4
C - display equipment	3	13	4
D - lamps	3	13	3
E - all other WEEE	3	13	4

Question 7: How could the management of the lockdown be better implemented next time?

Response: Several respondents indicated a wish for greater communication from the Government, one respondent expressed concern over feeling pressure to recommence service without receiving instruction on how to do so. Other themes within the responses included
- Better preparedness for a second lockdown – In general the respondents expressed a feeling that they were better prepared if a second lockdown was to occur and could even remain open.
- Better communication to the public – Two respondents expressed that there could have been better communication with the public on the impact of lockdown on services and how to store waste safely in the short term.

One respondent also suggested that more authorities should consider maintaining all material channels on reopening in order to ensure the flow of materials to their correct channels and minimize the loss of material to residual streams.

Question 8: What support / resources would help manage the flow of WEEE better on site in the future if lockdown is implemented again?

Response: Key themes within the responses included the following:
- Better communication and signage for the public: many responses noted a need for better signage and communication on site
- The provision of extra collections: several respondents expressed the desire to have greater flexibility of collections during and after lockdown.
- Public awareness campaigns: awareness campaigns for the public on the acceptable use of HWRC sites and waste streams.

About us

Material Focus is a new not-for-profit organisation – our vision is of a world where materials are never wasted.

Three I's inform and guide everything we do: inspiration, investment and insight.

Inspiration

We inspire people to change their behaviour. We do this through our Recycle Your Electricals campaign by revealing the hidden value of the materials in our electricals and by making it feel both easy (and normal) to reuse and recycle them.

Investment

We work with partners to expand the number, and type of collection points, making it easier for everyone to reuse and recycle their old electricals.

Insight

We fund technical research to overcome the barriers to reusing and recycling old electricals. Insight from this research galvanises new and innovative approaches to reuse and recycling, and supports enhancements to the UK waste electrical and electronic (WEEE) system.

MATERIAL FOCUS