



Report sponsors: Simon Aitken - Head of Service for street cleansing and refuse & Samantha Dennis - Director for public protection and Streetpride
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ITEM 16

Approval to implement litter bin sensor technology into street litter bins

Purpose

- 1.1 Derby City Council is committed to providing a clean, safe and attractive City. The purpose of the report is for the approval to implement litter bin sensor technology into litter bins.

Recommendation(s)

- 2.1 To grant approval to implement litter bin sensor technology into street and park litter bins.

Reason(s)

- 3.1 Litter bins provide an outlet for the public to dispose of their litter responsibly while outside of their homes, and overflowing bins can encourage litter being left next to the bin or not disposed of correctly.
- 3.2 APSE's state of the market surveys for street cleansing services in 2020, 2021 and 2022 demonstrates street cleansing services are driving towards innovative solutions to increase and maximise efficiencies. In the 2022 survey, the main efficiencies being proposed or worked towards includes 'better use of technology to maximise efficiency', 'use of smart litter bins reducing emptying frequencies' and 'route optimisation'.

A workforce management and mobile solution, Whitespace, linking frontline and office-based staff was introduced into street cleansing and grounds maintenance in 2020. This has driven service efficiencies and data reports to drive intelligence led decisions.

In February 2020, the street cleansing commissioned a trial of litter bin sensor technology within 200 litter bins, to assess the impact and benefits of the technology with grounds maintenance also implementing a trial across 30 park bins in July 2022. We now aspire towards embedding this permanently and expand on, to further increase our efficiencies and improve the litter bin service we operate.

- 3.3 The litter bin sensor technology trialled uses predictive 'fill-level' technology. The wireless technology monitors how fast a bin is filling and provides an alert to action the bin to be emptied.

The litter bins selected as part of this trial are 230 of our higher usage litter bins or bins receiving a high volume of complaints, which are on an enhanced emptying cycle due to the need of emptying in between the routine area cleansing.

- 3.4 Prior to the trial, these 230 bins formed the main workload of the enhanced litter bin team. The strategy used to empty these bins was that the teams had a worksheet with the 200 street and 30 park bins listed in order, navigating them around the City, where they worked down the list and restarted when they reached the end.

We are aware this was not the most effective and efficient way of carrying out this service, and in some cases we were still receiving customer reports that particular bins were overflowing in between the cycles; and in some cases the team were arriving to bins before they had reached full capacity. However, until the team arrived at each bin, there was no way of identifying the bins current fill level to be able to time the emptying of bins in the most efficient way.

The trial sensor results have shown a decrease of overflowing bin reports from customers and elected members for the bins trialling the technology. The result of only emptying bins when it is needed has shown a decrease of visits to street bins by 53% by cutting out unnecessary trips.

To demonstrate the reduction of unnecessary visits, figure 1 shows a bin serviced between 0 – 3 times per month since a sensor has been installed. Prior to the sensor installation, the bin was being visited for emptying 7 – 9 times per month.

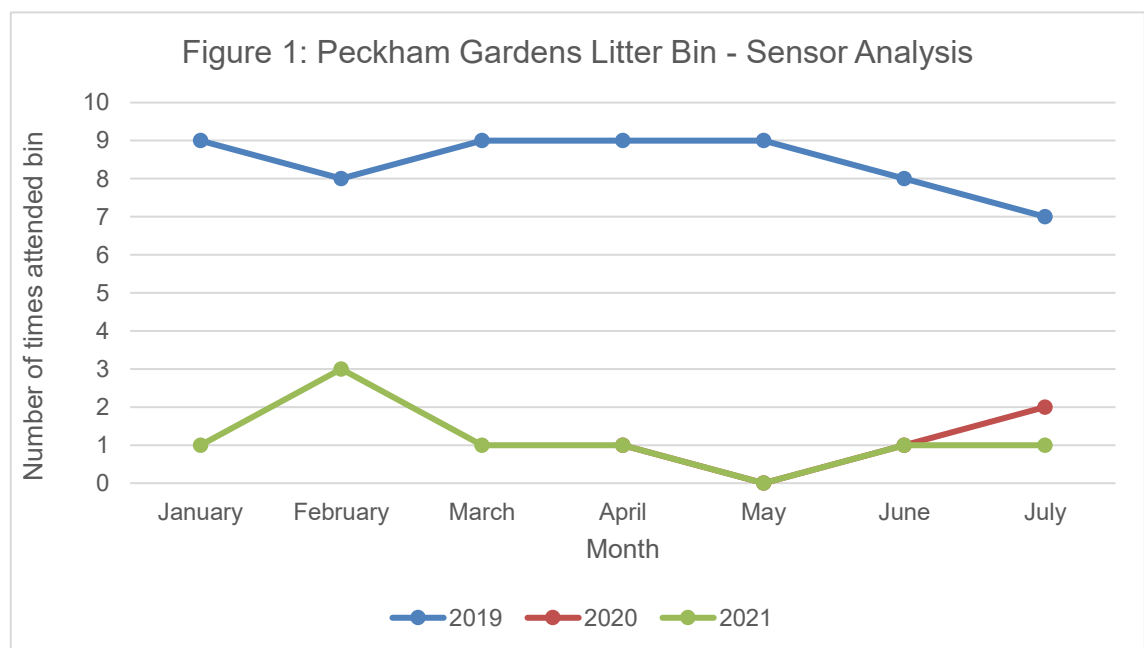
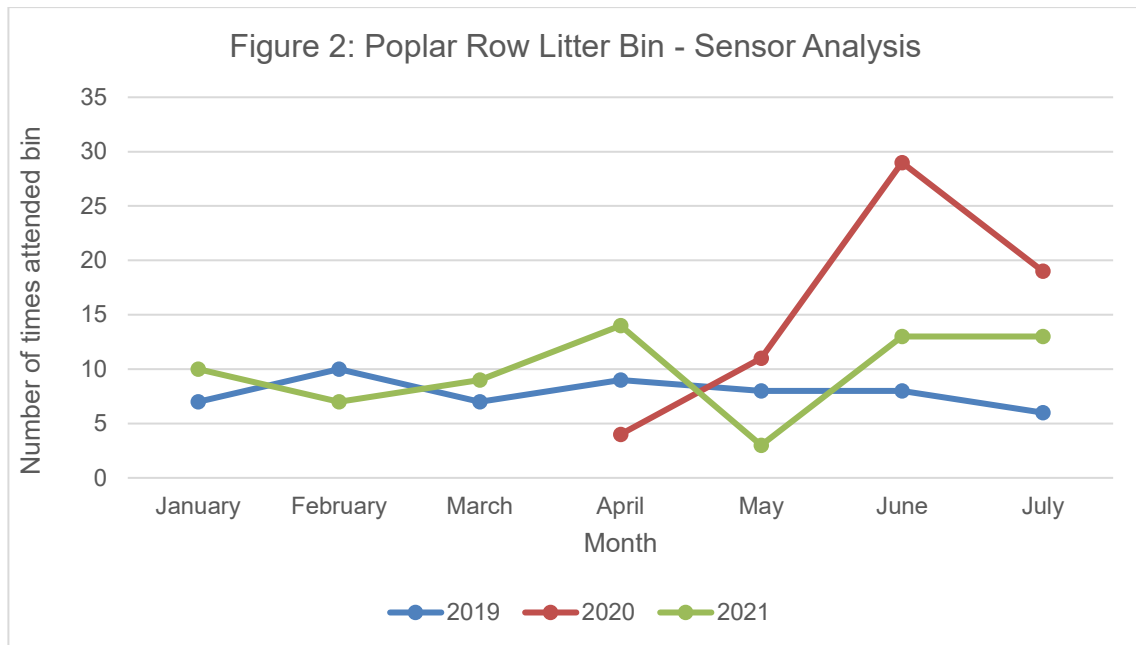


Figure 2: Prior to the sensor, this bin was emptied 6 – 10 times per month, and since a sensor has been installed this has been emptied between 4 – 29 times per month. Data suggests that before fitting the sensor, this particular bin spent a proportion of time full and overflowing. This is a typical bin which would lead us towards implementing a double capacity litter bin, which may still be emptied more frequently than the single bin was prior to the sensor being installed. Note: the data starts in April 2020 which was when the sensor in this bin was installed.



Emptying the 230 litter bins only when it is needed has freed up capacity of the litter bin team, now being able to be allocated the emptying of some non sensor bins. It is anticipated the teams will be able to maintain the additional sensor bins, doing ‘more with the same’, thus increasing the efficiency of the service.

Expanding the number of sensors will enable litter bin sensors to be deployed within all parks / grounds bins (the green cylindrical bins) and a proportion of street bins. The street bins will cover (1) our known higher usage bins, (2) bins identified from intelligence led data such as customer reports, and (3) areas which have less frequent routine cleansing, with area team cleansing on a monthly or six weekly basis.

Using this technology will also drive intelligence led decisions, such as helping to determine if areas require additional or double capacity litter bins to reduce littering. When additional bin requests are received, we can locate a temporary sensor bin to assess the fill level and determine if a bin is required.

Supporting information

Service operations

- 4.1 Street cleansing carries out routine cleansing in every street in Derby, this includes litter picking and the emptying of street litter bins. The City Centre and Zone 1 shopping areas are a seven day service, cleansed daily or a number of times throughout the day, operatives empty litter bins whilst carrying out cleaning of the surrounding pedestrian areas. The City centre, zone 1 shops and other areas which have frequent routine cleansing are the areas where we are not proposing to install sensors in this main roll out phase.

- 4.2 Grounds maintenance carries out the emptying of litter bins across the city's 375 parks and open spaces. This also includes the litter picking of these sites as well as routine collection of fly-tipped waste. These collections are carried out over a seven day period with collection frequencies ranging from daily to weekly depending on location and demand.
- 4.3 Areas outside of the City Centre and zone 1 shops are divided into a number of routes, which form the routine cleansing rota. The frequency of cleansing each route varies from twice a week, weekly, fortnightly, monthly to every six weeks, the frequencies are determined by the rate in which cleansing standards fall below a required standard. The wards cleansed every six weeks are Mickleover, Oakwood and Allestree; the wards cleansed monthly are Littleover, Spondon, Chaddesden, and parts of Boulton, Blagreaves, Alvaston, Mackworth, Darley and Chellaston.
- 4.4 In addition to the routine cleansing arrangements, street cleansing have a resource which focuses on emptying litter bins which cannot last the cleaning frequency of the area that it is situated in. This resource is 2 FTE's and 1 vehicle, the 2 FTE's work on opposite shift patterns to provide a seven-day service. Details of how this team carried out the work prior to the litter bin trial is explained in section 3.4.
- 4.5 From April 2021 – March 2022 785 overflowing litter bin reports were actioned by street cleansing for overflowing litter bins. Around 69% of these reports were customer reports, and 31% from internal colleagues or elected members.
- 4.6 Analysis of reports highlights a significant proportion of these reports are within areas cleansed on a monthly or six weekly basis, where sensor technology is being proposed.
- 4.7 To support the roll out, a full audit of the street and park litter bins was carried out in 2021, identifying the exact location, type of bin, and the condition of each bin. A programme is currently taking place to replace any bins with significant wear or damage, which will enable a sensor to be installed.

In addition, all post mounted 50L capacity bins have been assessed for the suitability of replacing with a higher capacity bin. Out of the 117 post mounted bins, some need to remain as 50L bins, based on factors such as the width of the pavement, but around a third of these can be replaced with a 120L capacity bin. This will increase bin capacity, increasing the time the bin will reach full capacity, reduce complaints and also enable a sensor to be installed.

Public/stakeholder engagement

- 5.1 APSE's state of the market survey for street cleansing services 2020, 2021 and 2022 market surveys demonstrate street cleansing services are driving towards innovative solutions to increase and maximise efficiencies. In the 2022 survey, the main efficiencies being proposed or worked towards includes 'better use of technology to maximise efficiency', 'use of smart litter bins reducing emptying frequencies' and 'route optimisation'.

- 5.2 Litter bin sensor technology is now being used globally to drive efficiencies. Douglas Borough Council embarked in using sensor technology and adapting the size of their litter bins a number of years ago. The results of this was an increase of service efficiency, and in 2017 Douglas Borough Council waste services team was given the Keep Britain Tidy award for quality improvement based on the results of the bin sensor project.

Financial and value for money issues

- 6.1 The cost of sensor technology is based on a lease model, which allows us to use both the technology hardware and software, with the provider maintaining hardware liability. The cost breakdown is as follows:

Figure 3: Cost breakdown	
Year	Cost
Year one	£76,215
Year two	£75,952
Year three	£78,231
Year four	£80,578

The budget for this has been identified within the existing cleansing and grounds budgets.

Legal implications

- 7.1 The legal implication of enhancing the litter bin emptying is in line with the standards set out within the Environmental Protection Act 1990 and the Code of Practice on Litter and Refuse 2006. Implementing this technology will reduce the risk of breaching the requirements set out within the Environmental Protection Act 1990, by providing bin capacity for the public to responsibly dispose of their litter.

Climate implications

- 8.1 Section 3.4 demonstrates the emptying method used prior to trialling sensor technology, which is still used within bins without a sensor which require more frequent emptying than the routine area cleansing. Introducing technology into our litter bins will enhance the efficiency of litter bin emptying, meaning the bin will be emptied only when it is required. In addition, digitising the litter bin collections will enable better route optimisation. This will reduce our carbon footprint and have a positive environmental impact.

Socio-economic implications

- 9.1 This recommendation does not affect the frequency of routine cleansing set in any area of Derby. In areas where we are not proposing to install this technology in this main roll out phase there is a higher frequency of routine cleansing including daily, twice a week, once a week and once a fortnight. This is with the exception of any known high usage bins in the area supported by local knowledge and data from reports received.

We do not envisage any negative socio-economic disadvantages from approving this recommendation.

Other significant implications

- 10.1 The roll out of sensor technology is a new and exciting opportunity for the service. While it is anticipated this will provide a positive impact to Derby and the community, monitoring of resources will be required throughout the first year. A possibility is that the service may need to increase resources should the demand consume the resources we currently have. An example of this is the litter bin in figure 2, where emptying has increased from 6 – 10 times per month to 4 – 29 times per month.
- 10.2 A further implication of not progressing with using this technology, is the impact of removing the existing sensors installed. These have been installed from since February 2020, which has reduced overflowing bin reports and increased service efficiency.

This report has been approved by the following people:

Role	Name	Date of sign-off
Legal	Olu Idowu	09/08/2022
Finance	Janice Hadfield	17/10/2022
Service Director(s)	Samantha Dennis	
Report sponsor	Samantha Dennis Simon Aitken	
Other(s)		