

Bin Sensor Project Report - Trial 2023

1. Introduction

There are approx. 2900 standard litter bins within the admin area of Dublin City Council made up of three main standard bin types as follows;

1000 A types, which are primarily in the city centre and at neighbourhood shops and takeaways,

1400 B Types, which are primarily in the suburbs

550 cast iron, which are primarily in heritage areas

There are also approx. 380 solar compacting smart bins that provide real-time fullness information and send email notifications at specific times of all full smart bins on a route which is given to the GO so he only needs to empty those that are full. This works quite well so WMS decided to look at options for our standard bins.

A trial was undertaken to understand the capabilities, limitations and suitability of retrofitting fill level bin sensors on our standard bins.

2. Project Overview

The trial selected one sideloader route on the North of the city and one on the South totalling 130 standard litter bins. Sensors and notifications were set up to be similar to those already received from the solar compactor bins and local management and general operatives responsible for the routes selected were trained on the use of the platform and how bins should be emptied on notifications only. Supervisors were to monitor the routes to ensure that the level of service does not decline due to emptying on notifications only.

January and February's 2023 sensor data provided a baseline of fill levels of bins as there are emptied during normal operations and additional sensor set up and teething issues. Data from March to May 2023 captured fullness data, frequency of collection and time to fill information of the bins and provided feedback from our operations crews the early trial data. Adjustments were made to sensor positions and emptying methods were updated to maintain the level of service on the routes for the remainder of the trial.

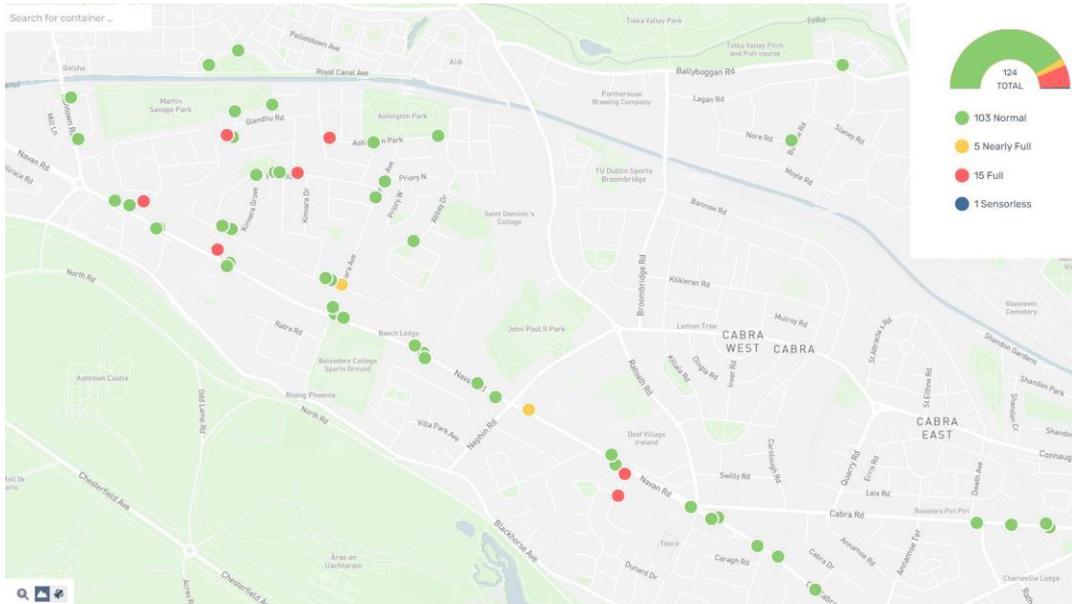


Figure 1. North Route

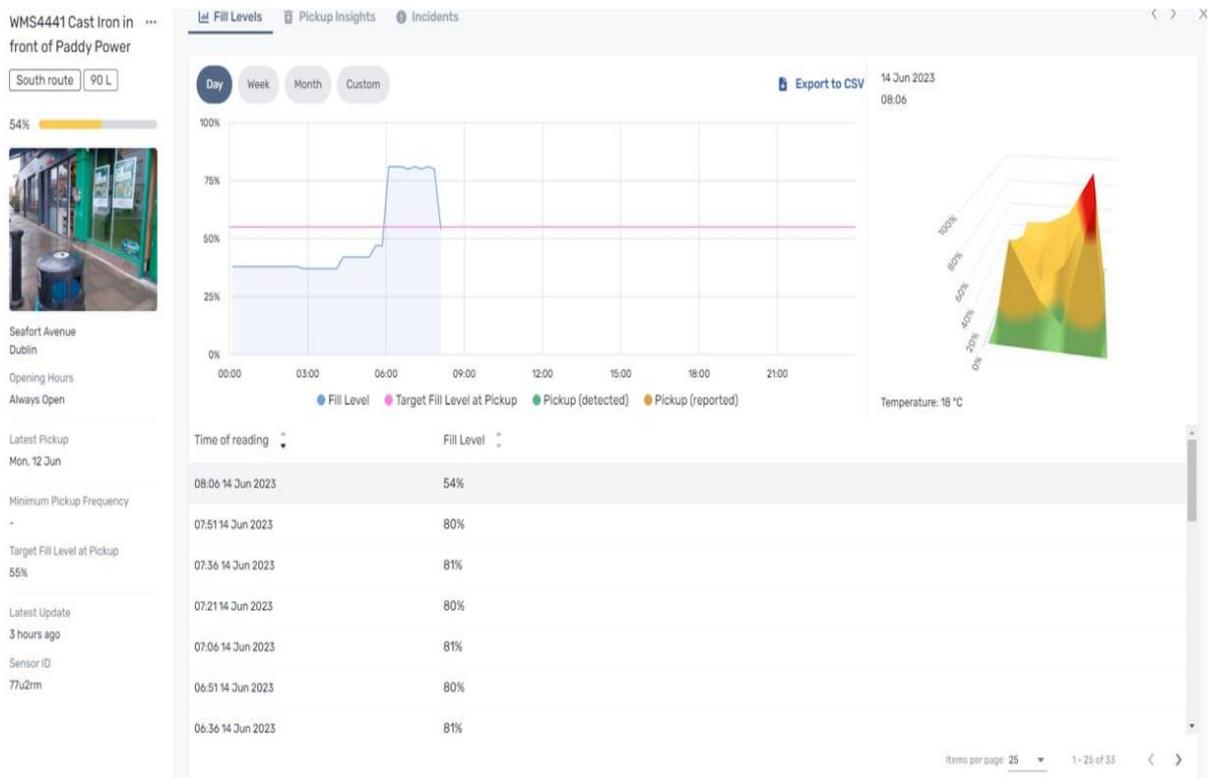


Figure 2. Platform showing real time fullness information

3. Findings

- a) Litter bin type and iteration has an impact on the reliability of the fullness information data.

Due to standard litter bins having an ashtray in the optimal (central) position for this type of sensor all sensors had to be installed off centre and facing into the base of the bin at an angle. Older iterations of our B Type bins have internal side chutes that create shadow preventing the sensors reaching deeper into the bottom of the liner meaning that multiple sensor profiles had to be configured to improve the fullness information. Cast Iron bins have similar issues where sensor location was different in older iterations of the bins.



Figure 3. Internal Side Chute causing shadow

- b) Limitations with the platform used to give fullness information of the bins were also identified during the trial.

There is no functionality for the platform to send automatic email notifications, the supplier is working on this. There is a workaround by filtering the routes and printing this off to hand to the GOs.

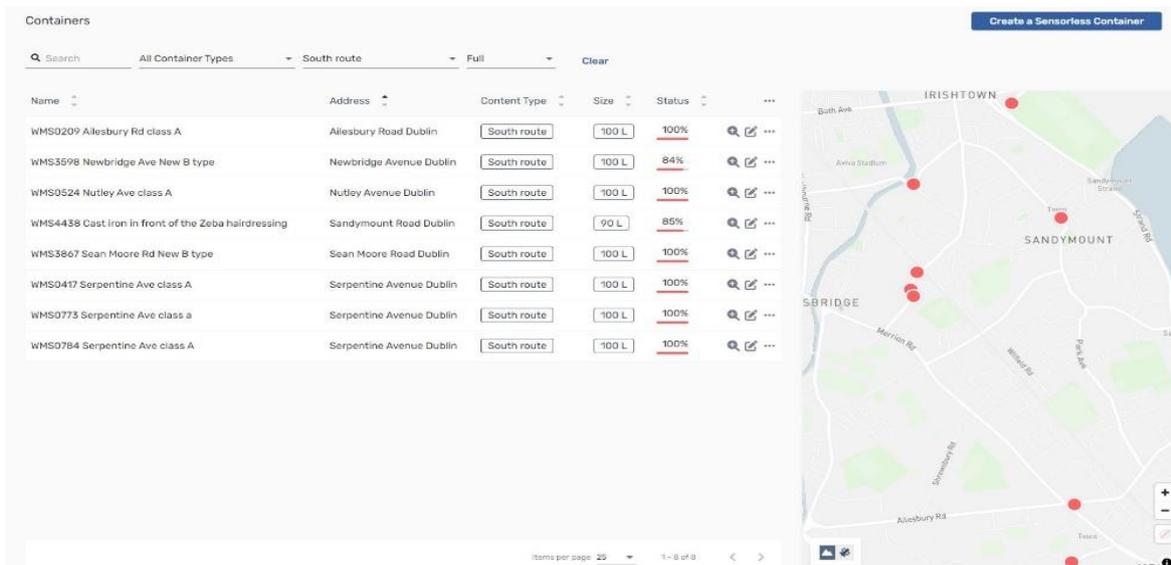


Figure 4. Full bin list provided to GO

c) Connectivity issues with the 2G network.

During the trial bins that were full were not on the fullness notifications. It was identified that sensors were trying to connect at the time that the system was recalling fullness data. This meant that when local management printed lists of full bins not all full bins were on the notification.

d) Battery Life

As the trial progressed some sensors went offline due to depleted batteries. By the end of the trial 75% of sensors experienced battery deficiencies. Initially it was thought to be the connectivity issues causing the batteries to deplete rapidly. It was later determined that the batteries were sub-par and the supplier is working on upgrading them in future sensors.

e) Operations Feedback

After receiving feedback from our operation crew the fullness level of the bin was reduced from 80% to 70% as bins were overflowing more often. This was due to the limited capacity of our standard litter bins and if a bin was near 80% it was not emptied but likely to be full and overflowing before the next notification was sent.

4. Conclusion

Overall the product trialled is not yet fit for purpose. Initial findings looked quite positive but after the trial period the limitations with the platform, the sensor connectivity issues, battery life, multiple sensor profiles and non-real-time fullness information means that we would not see the true potential and effectiveness of the roll out of the technology to warrant the cost of its implementation.