



WASTE SAMARITAN

India's first digitized door-to-door waste
segregation and collection monitoring solution

waste.samaritan@gmail.com

INCEPTION . . .





PROBLEM STATEMENTS



2 bins + 1 bag

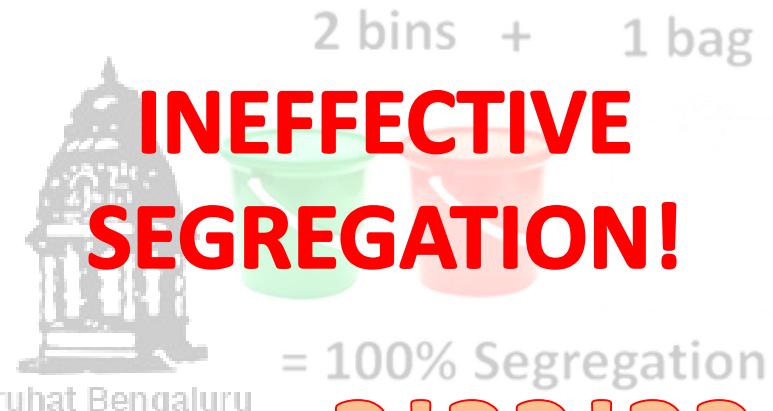


= 100% Segregation

?!??!??



PROBLEM STATEMENTS



**INEFFECTIVE
SEGREGATION!**

??!??!??!



landFULL . . .



**ENORMOOURS
QUANTITIES!**



PROBLEM STATEMENTS

FILM OF FILTH

56L tonnes of plastic waste dumped by India in a yr

9,205 tonnes is recycled

6,137 tonnes is plain litter



METRO LITTER

Delhi	690
Chennai	429
Kolkata	426
Mumbai	408 tonnes per day

SOLID WASTE DISPOSAL IN DELHI

9,000 metric tonnes of municipal solid waste produced every day



18,000 metric tonnes of MSW will be produced by Delhi per day by 2021, as per a High Court-appointed committee

3 sanitary landfill sites cover a total area of 164 acres, at present

650 acres - the land, as per the committee, that the city needs to take care of its trash

TRASH TREATMENT

Environment ministry comes out with draft rules for comprehensively managing



- Municipal Solid Waste
- Electronic Waste (e-waste)
- Plastic Waste
- Medical Waste

INDIA GENERATES EVERY YEAR



400,000 tonnes of electronic waste



1.5 million tonnes of plastic waste



1.7 million tonnes of medical waste



48 million tonnes of municipal waste

**DATA
IS NOT
DIGITIZED /
AUTHENTIC!**

Environment ministry puts these draft rules on its website, seeking public\expert\stakeholders opinions within 60 days

Final rules will be notified after taking into account views of stakeholders in June or July

**DATA
IS NOT
FROM
SOURCE!**

D2D COLLECTION & MONITORING SOLUTION



[Click HERE to view a video of the collection process](#)



Pilot: Location, Timelines and IMPACT

Pilot Launch (15/5/2017)

Data Collection Phase Commenced for 80 houses.

24/5/2017

Data collection (in-progress for 91 houses)

1/7/2017

Data collection (in-progress for 152 houses)

22/5/2017

Data collection (in-progress for 85 houses)

1/6/2017

Data collection (in-progress for 123 houses)

Pilot complete (29/8/2017)

Staggered data available for 152 houses over the timeline)

- QR codes were installed for 80 houses (spanning 5 streets) initially and then for more number of houses (streets) as indicated in the timelines.
- Hence, graphs reported hitherto are subject to the availability of data across the above timelines.

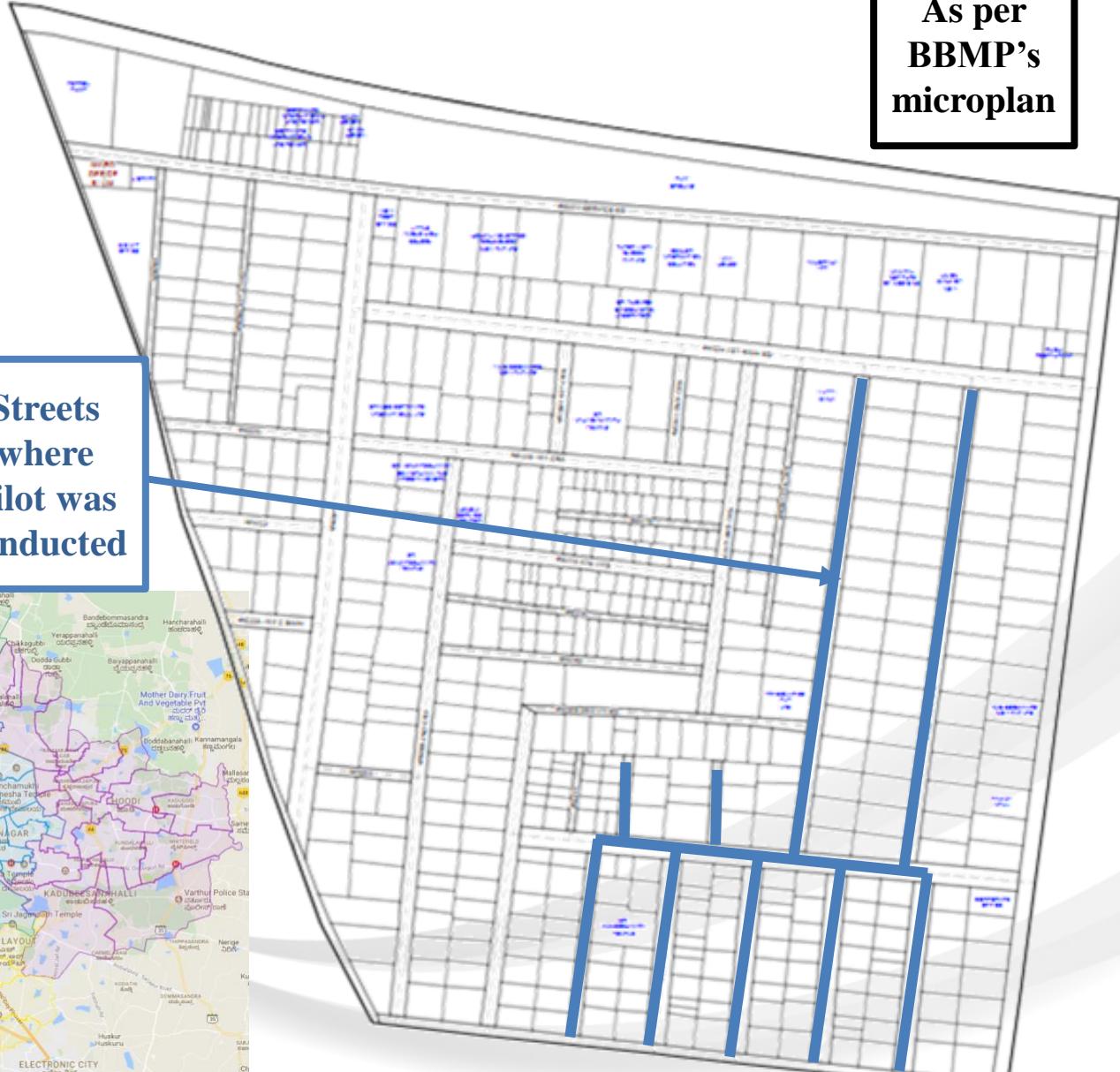
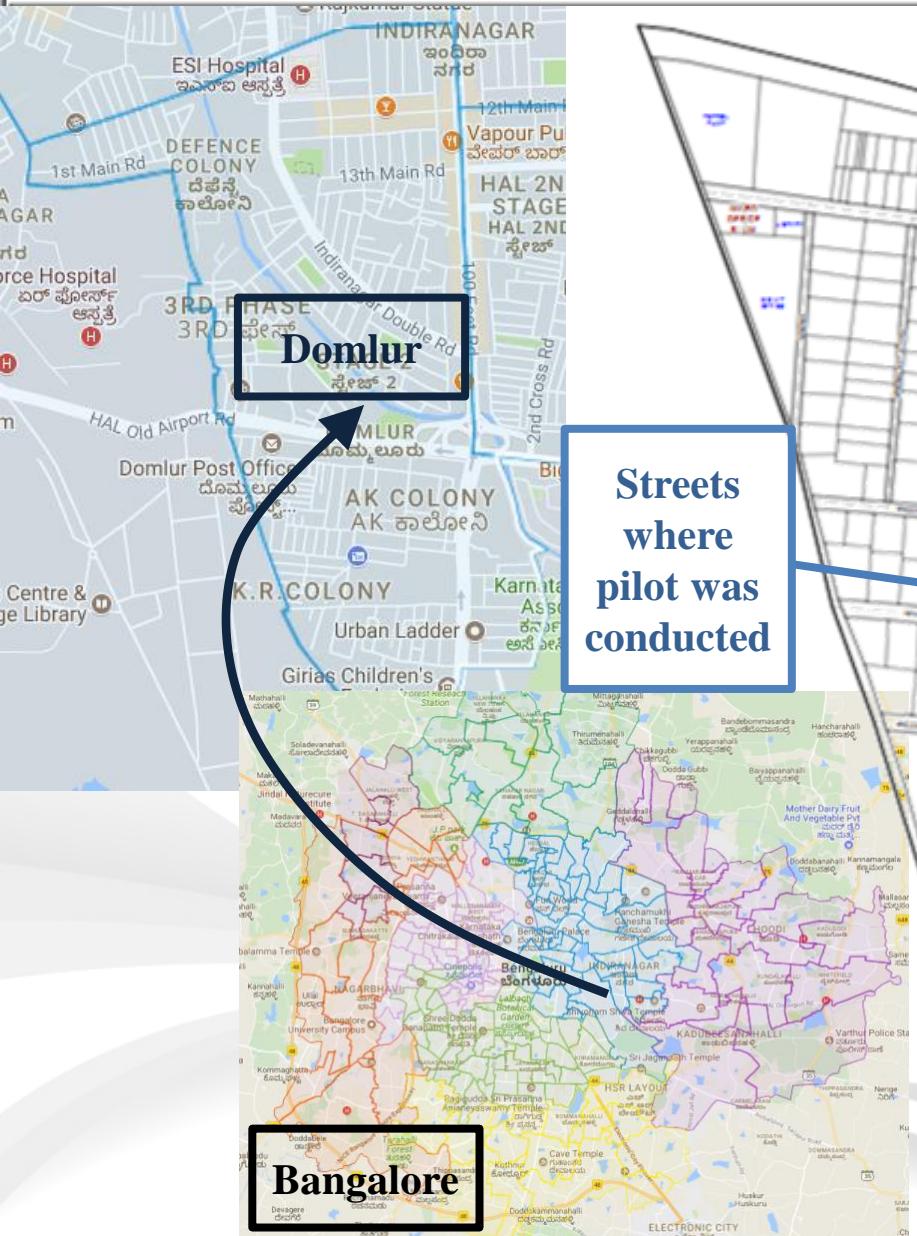
Pilot: Location, Timelines and IMPACT

WARD-112
DOMLUR

BRUHAT BENGALURU MAHANAGARA PALIKE

BLOCK-12

As per
BBMP's
microplan



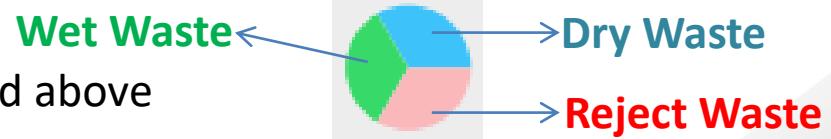
Graph legends and their interpretation

- **Green – Wet waste | Blue – Dry waste | Red – Reject waste**
- The shades further indicate the rating / quality of segregation of that category of waste.

Ex:



- In the Map interface, each circle represent the geo-tagged location of a particular property. Each sector further represents a particular category of waste based on it's position as indicated alongside.



- Further shades reveals rating as explained above



• **Black** represents “**Unsegregated Waste**” – all categories mixed.



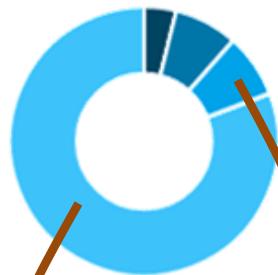
• **Yellow** represents “**No Waste**” and can be for a particular category or all.

Pilot: Location, Timelines and IMPACT

Dry Waste

Rating

- 5
- 4
- 3
- 2
- 1



Across 80 houses

Rating

- 5
- 4
- 3
- 2
- 1



Across 152 houses

Wet Waste

May 17th, 2017

Rating

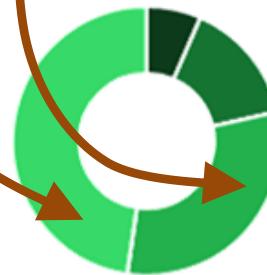
- 5
- 4
- 3
- 2
- 1



80 houses

August 2nd, 2017

- 5
- 4
- 3
- 2
- 1

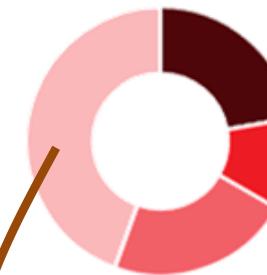


152 houses

Reject Waste

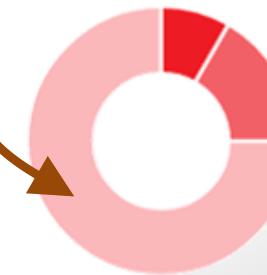
Rating

- 5
- 4
- 3
- 2
- 1



Rating

- 5
- 4
- 3
- 2
- 1



There was a significant increase in the good quality ratings across each category as seen above in the three months from May to August 2017.

Case: Transformation / learning to segregate . . . *perfectly!*



Day 1

Day 3

Day 9

Day 10

Day 15

Day 16



Day 2

Day 6

Day 7

Day 11

Day 14

Day 17

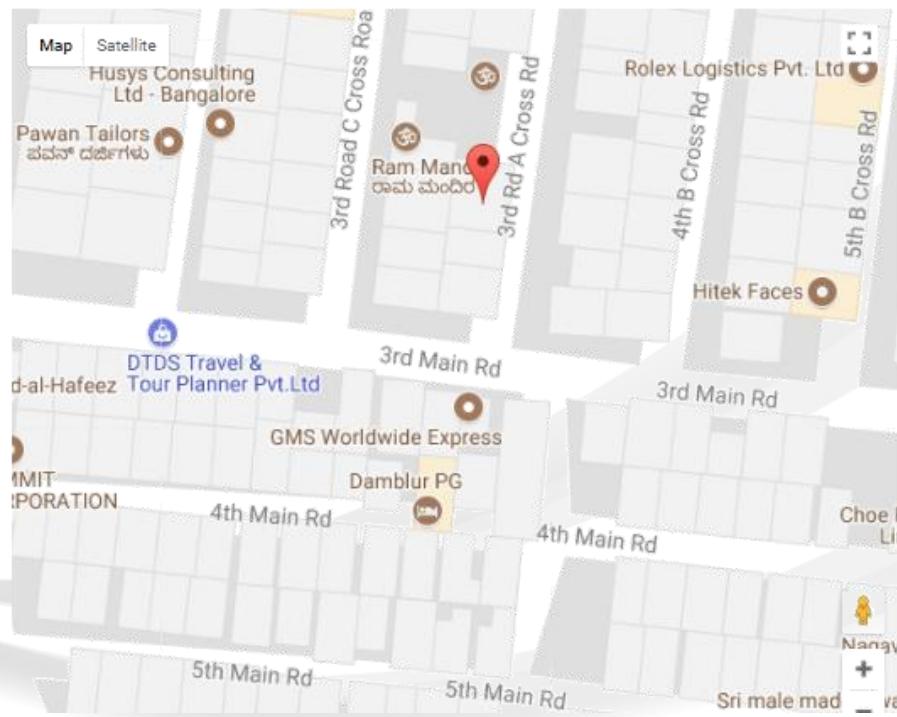
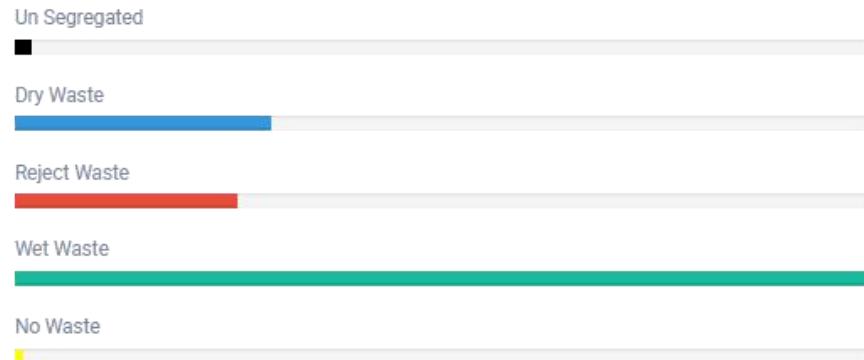
Pure organic waste in a bin without using plastic linings



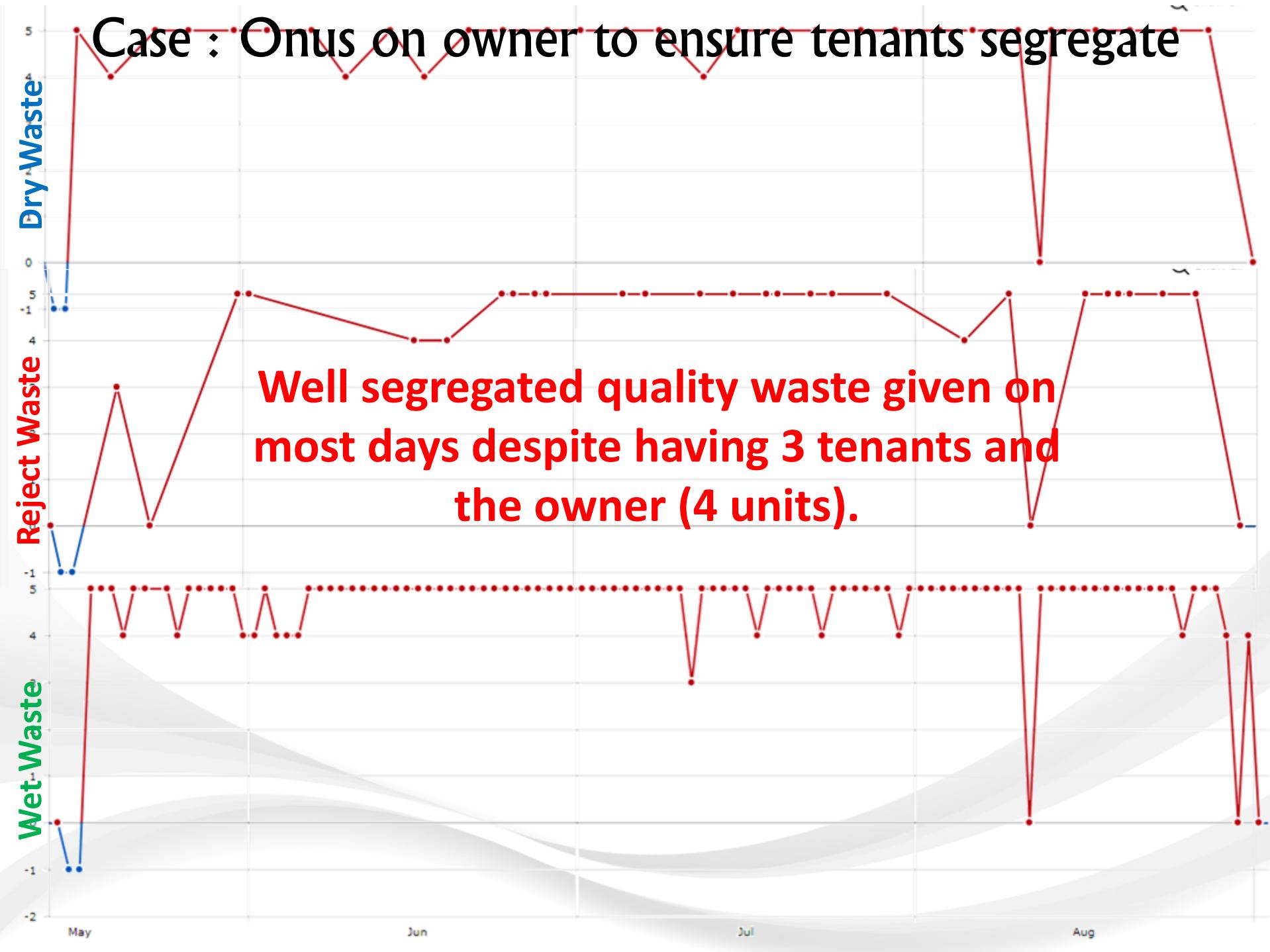
Case : Onus on owner to ensure tenants segregate

Property Summary of (WS060)

BBMP ID	[REDACTED]
PropertyID	WS060
Owner Name	B Manjunth Naidu
Phone	0525226913
No.of Bachelor	1
No.of Family	3



Case : Onus on owner to ensure tenants segregate



Case : Onus on owner to ensure tenants segregate

Wet Waste | WS060

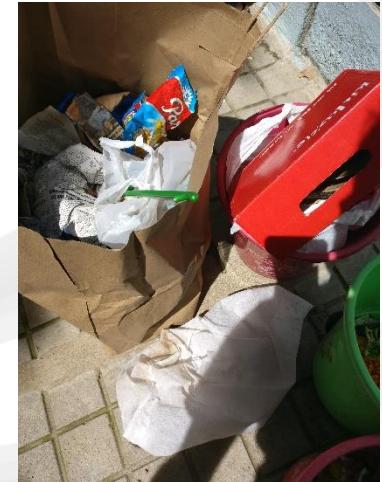


Owner ensured all tenants segregated wet waste without using plastic linings.

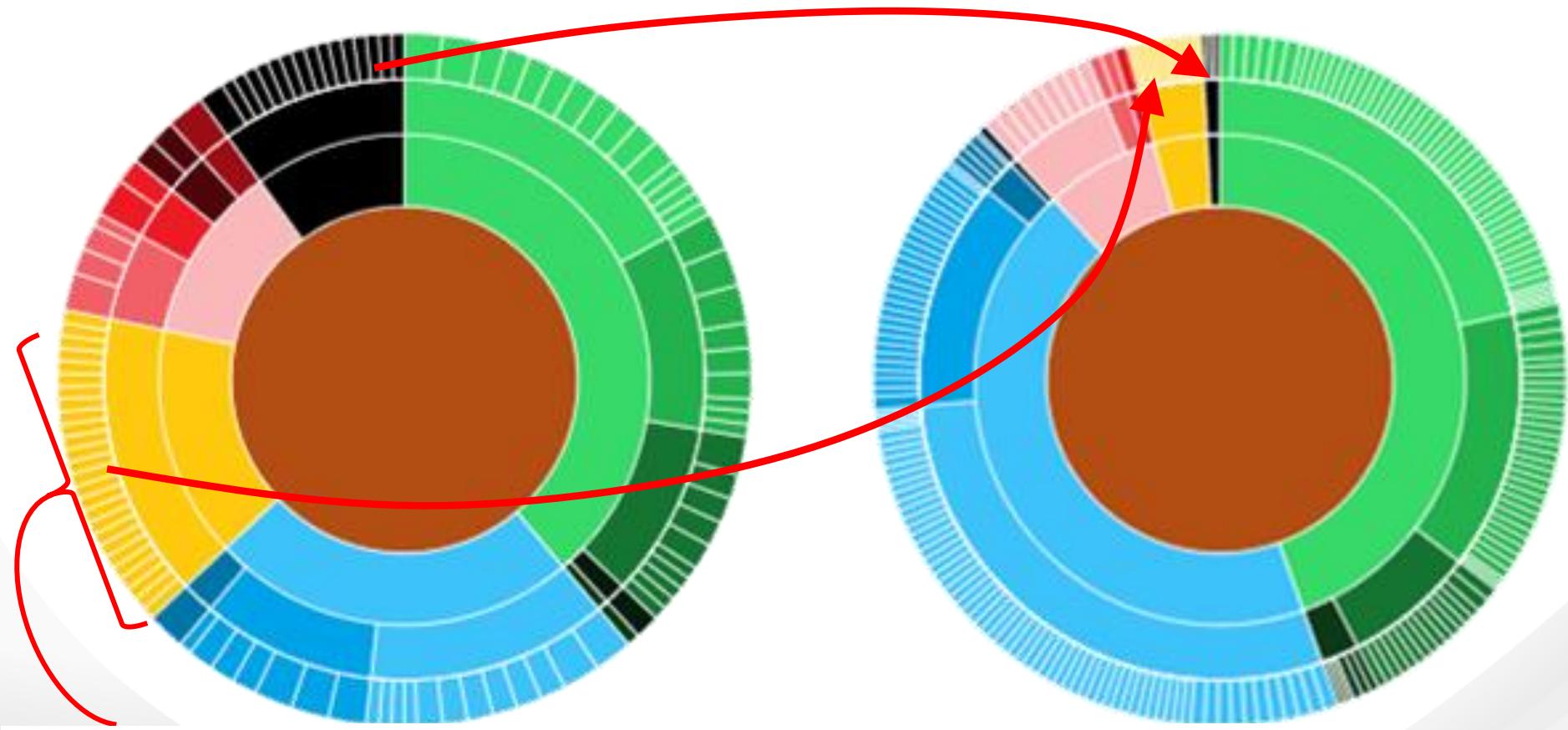


Clean dry waste was given out in bags without any mixing

Dry Waste | WS060



Data Drill – down to identify non-compliance



- There has been a notable reduction in number of houses giving out **Unsegregated Waste**.
- The number of houses not giving out waste (**"No Waste"**) has also significantly reduced due to a more regular, reliable and streamlined collection system in place and daily door-to-door monitoring.

Data Drill – down to identify non-compliance



Data Drill – down to identify non-compliance



Case : Evidence for identification of non-compliant households & Plausible sources of blackspot generation

Property Summary of (ws016)

BBMP ID	██████████
PropertyID	WS016
Owner Name	Not Available
Phone	Not available
No.of Bachelor	0
No.of Family	1

Un Segregated

Dry Waste

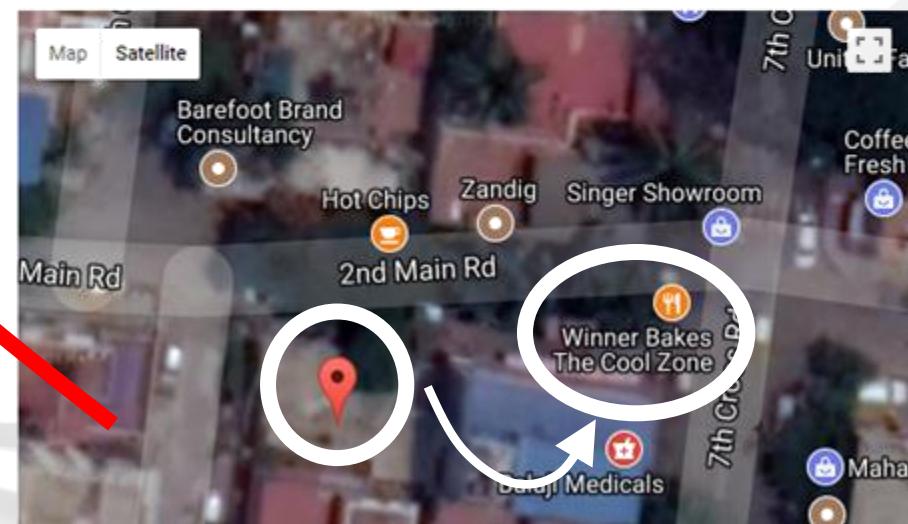
Reject Waste

Wet Waste

No Waste

Data is available that WS016 has NEVER given out waste during the pilot period.

The person residing in this house runs the bakery adjacent to it. They handover all their mixed waste to the BBMP auto tipper along with waste generated from the bakery.

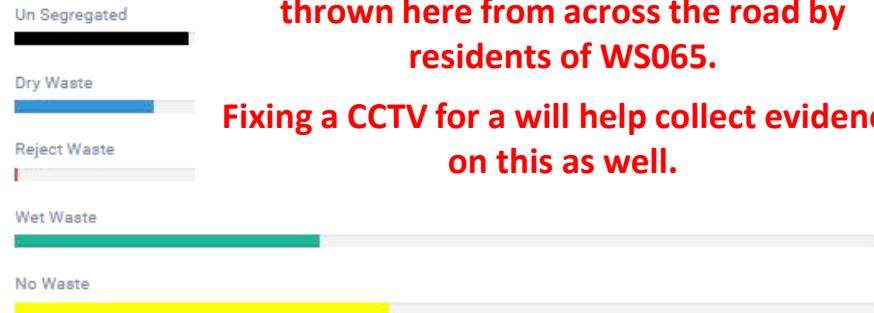


Case : Evidence for identification of non-compliant households & Plausible sources of blackspot generation

Data is available that WS056 has OFTEN not given out waste during the pilot.

Property Summary of (WS065)

BBMP ID	14444444444444444444
PropertyID	WS065
Owner Name	T G Balasundaram
Phone	9844729266
No.of Bachelor	0
No.of Family	Not available



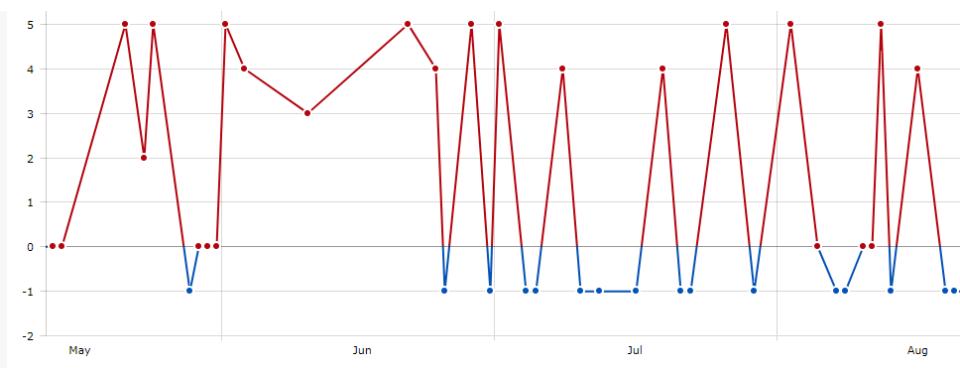
Either no waste was generated or some of the garbage bags in the vacant site are being thrown here from across the road by residents of WS065.

Fixing a CCTV for a will help collect evidence on this as well.

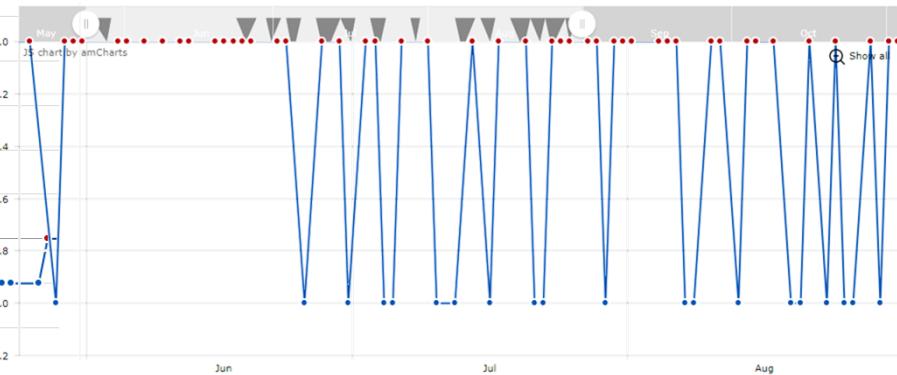


Case : Evidence for identification of non-compliant households & Plausible sources of blackspot generation

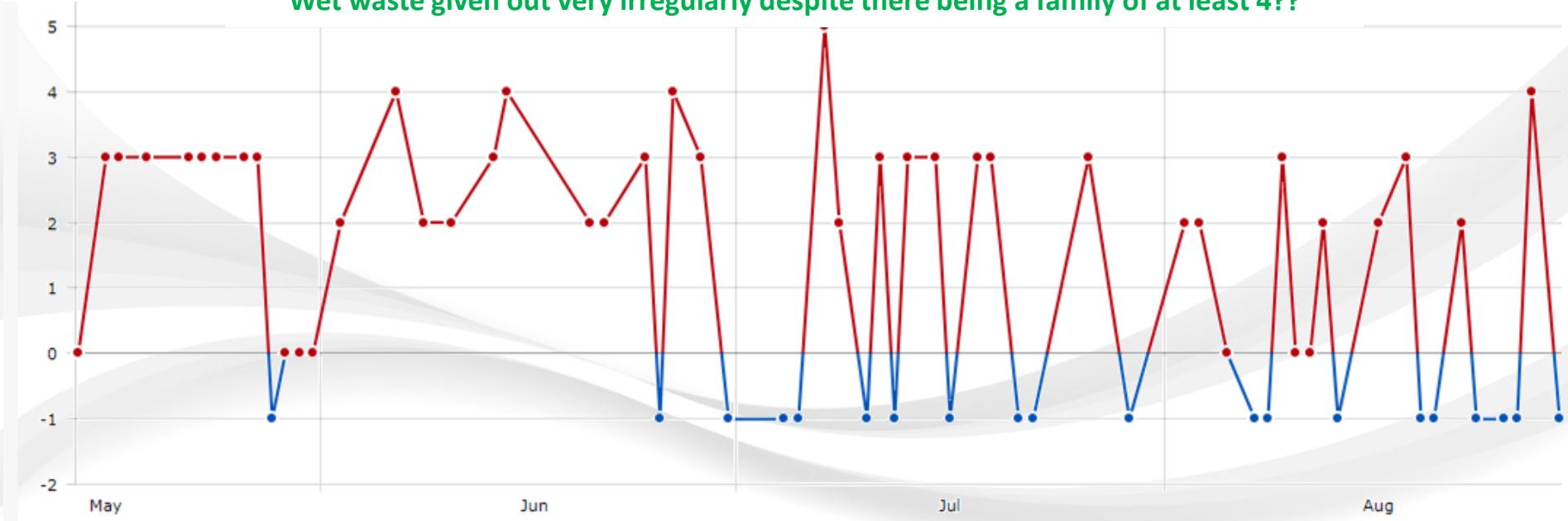
Dry Waste given out at regular intervals



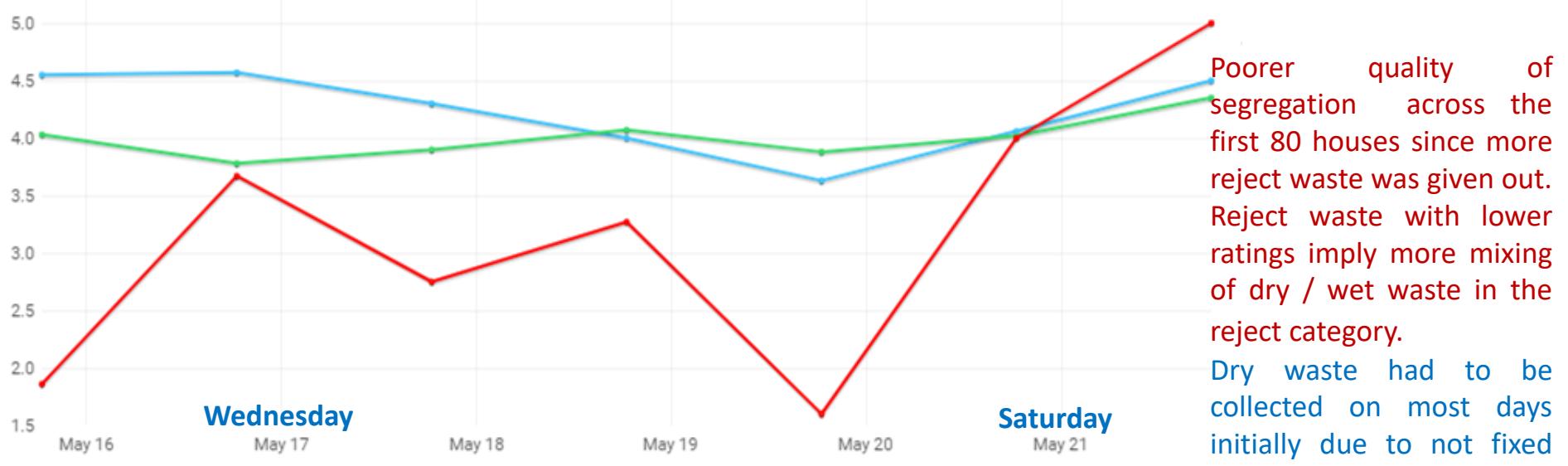
Reject Waste - never; Unsegregated waste - mostly



Wet waste given out very irregularly despite there being a family of at least 4??

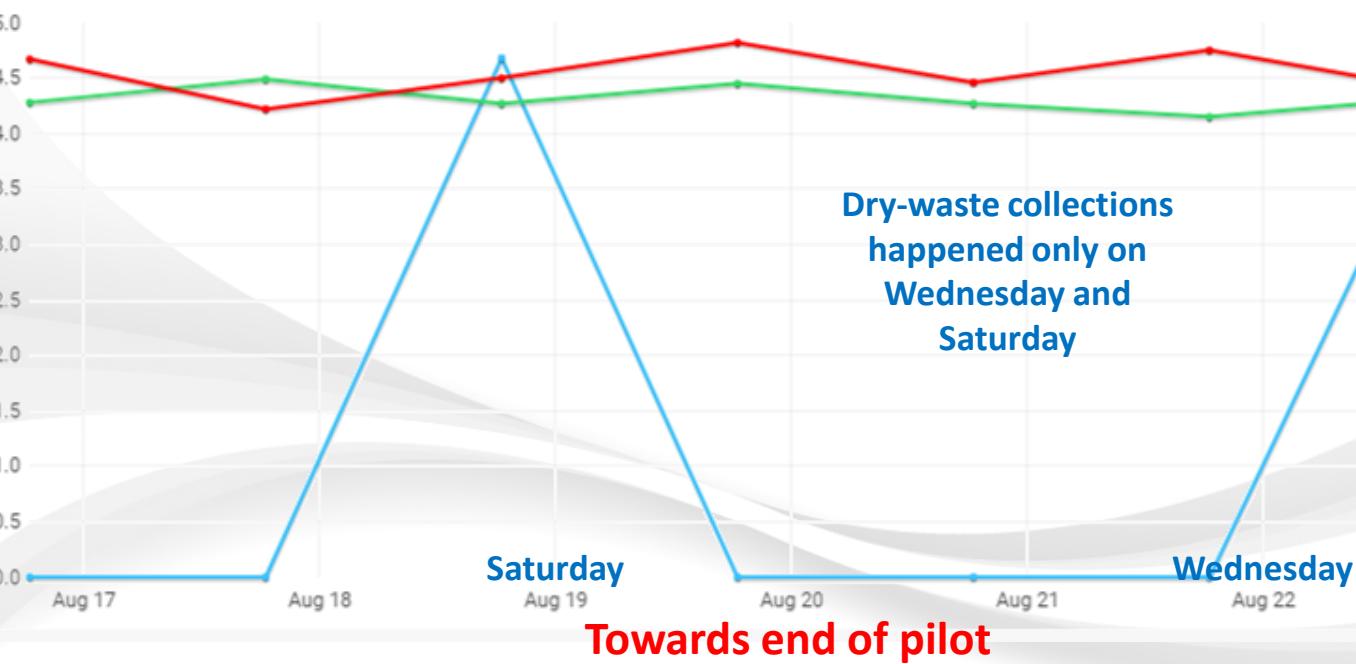


Average segregation quality across all households versus days of collection



Poorer quality of segregation across the first 80 houses since more reject waste was given out. Reject waste with lower ratings imply more mixing of dry / wet waste in the reject category.

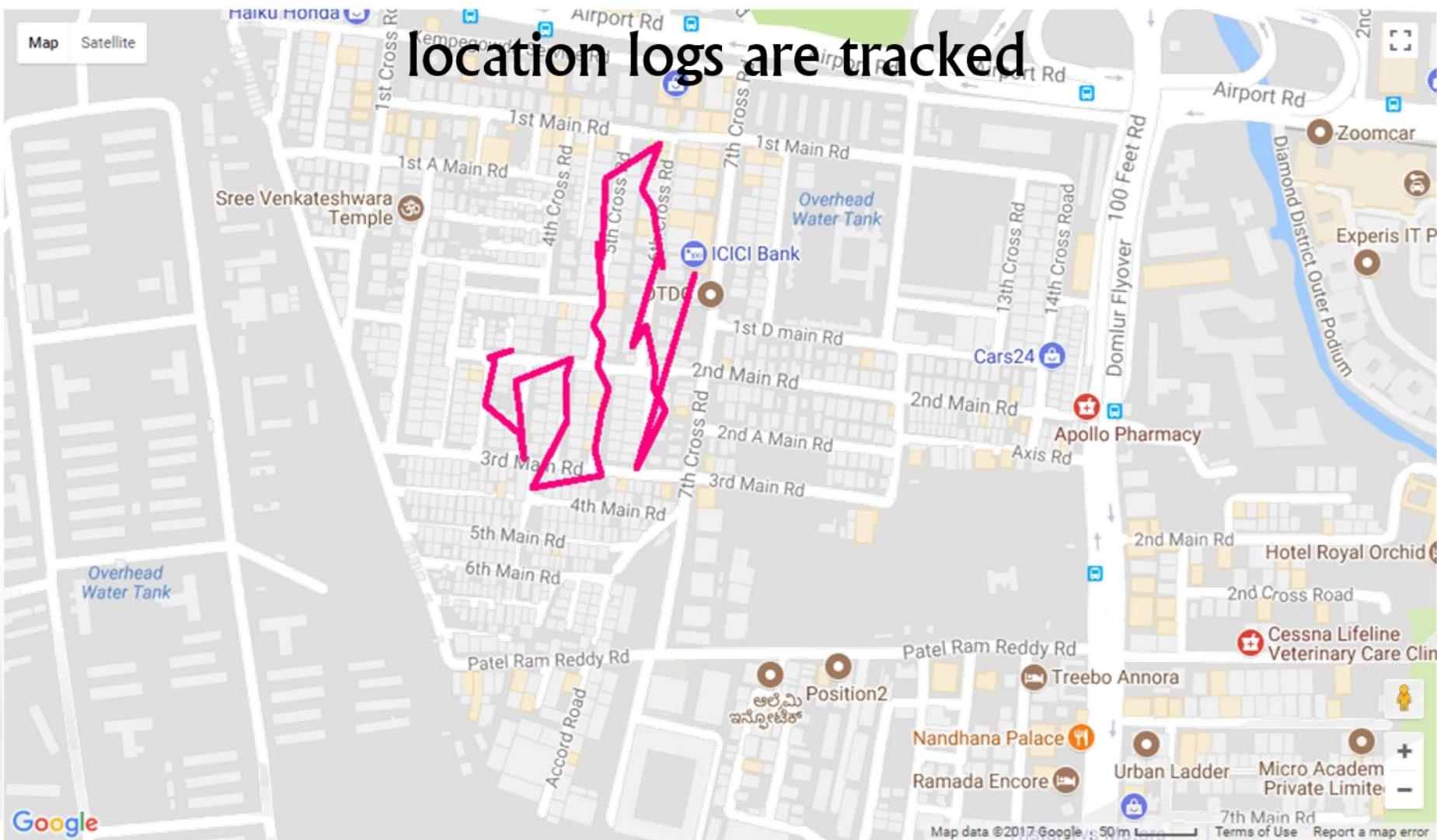
Dry waste had to be collected on most days initially due to not fixed collection days earlier.



Improved quality in reject waste segregation also resulted in better quality of segregation across other categories. This drastically brought down the quantity of reject waste to 1/3rd.

Dry waste collection has been streamlined and is done only on Wednesdays and Saturdays.

Better adherence of the collector as routes and location logs are tracked



CollectorID	Date(YYYY-MM-DD)	Start time	End time	Total time
aristotle	2017-07-22	08:30:32	10:27:30	1:56:58

Impact and Outcome in Summary

- Door-to-door monitoring ensured that households were giving out waste firstly to the authorized collection team and in a segregated manner.
- Quality of segregation improved through the pilot and hence there has been reduction in the quantity of mixed / reject waste overall.
- Collection days and process has been streamlined since data / evidence of dry waste given on odd days is being tracked.
- Better adherence of the waste collector as date, time, routes and location logs are tracked.
- Citizens are willing to comply,(learn to) segregate at source handover to appropriate collection channel if the monitoring and collection systems are in place.

Social Impact on Waste Collectors

- Treated with more dignity.
- More interaction with citizens in learning from them on waste management.
- Appreciation from citizens for hard work, effort and labour involved.

Feedback from Citizens

We like the collection mechanism where different categories are being collected separately. Please continue with the collection as the contractors tend to mix once they are back to work here.

- [WS025] Mrs. Kalaivani , 5th Cross, Domlur Layout

Critical Success Factors

- **Preparatory Phase**
 - Domlur Layout RWA's and Corporator's Support
 - QR Codes
 - Survey and D2D Campaigning / Awareness
 - Property Owner's responsibility on ensuring tenant's compliance (Consolidated rating)
- **Collection Phase**
 - Active and Passive **Feedback**
 - All **evidence** collected for good/bad segregation
 - Citizens **FEAR** of penalty
 - Collectors **NEED TO PROVIDE DATA** for payments and incentives.



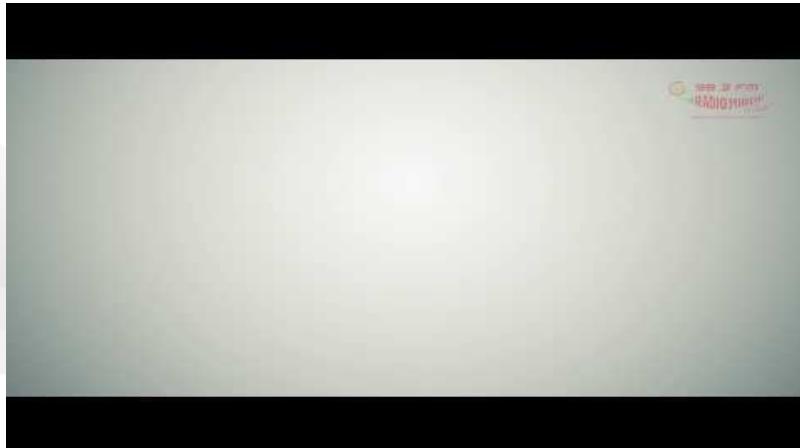
Media Coverage and Citations



[NEWS9 – English](#)



[TV9 – Kannada](#)



[Radio Mirchi - Kannada](#)

2016

- [Deccan Herald](#)
- [Economic Times](#)
- [New Indian Express](#)

2017

- [Economic Times](#)
- [The Hindu](#)
- [New Indian Express](#)
- [SwacchIndia](#)
- [NDTV.com](#)

Progress Post WS Domlur Pilot



Interaction with these entities and quotations/proposals submitted for various customized solutions.



CIFOS

Partnership with TAICT



- Waste Samaritan partnered with TAICT for their EcoGram project in February 2019.
- The Waste Samaritan app has been used by them for monitoring collection and operations by service provider Hasiru Dala Innovations (HDI).
- The solution helps monitor the number of villages, households covered by the collection team of HDI, frequency of collection, village wise breakdown of households serviced, performance of collectors and number of hours spent on the field for waste and data collection, etc.

Enhancements & Bug fixes

- Various crashes and bugs due to updates in APIs were fixed and ensured seamless collection operations at EcoGram.
- A Survey and onboarding module has been developed for direct onboarding of waste generators.
- An interface for keying the quantity of waste per category has also been developed and ready for deployment
- V2.0 of the cloud-integrated wireless weighing scale has been developed and is in Beta testing stage – to be ready for deployment shortly.

Noteworthy Achievements

Innovation Challenge

Design Bengaluru

The Challenge is a project of the Tata Centre for Development at UChicago and the Urban Development Department of the Government of Karnataka

One amongst 9 finalists out of 170 solutions pitched



22-24 October | Kuala Lumpur Convention Centre

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