



WASTE SAMARITAN

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

waste.samaritan@gmail.com



INCEPTION . . .

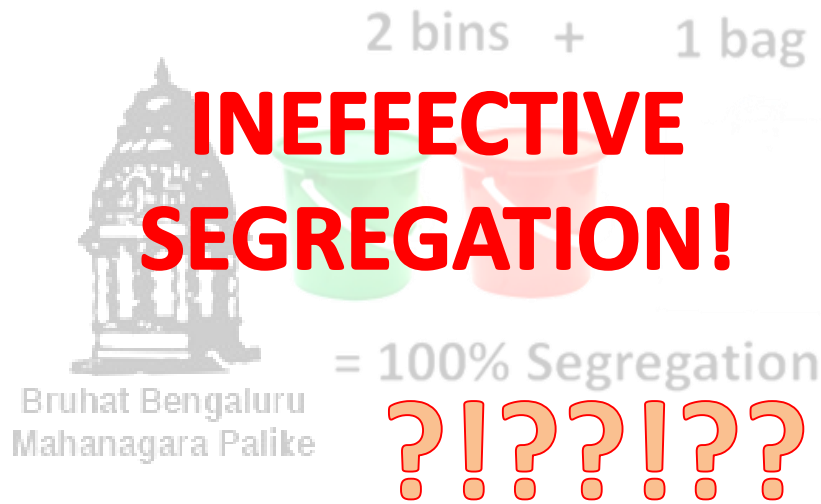




PROBLEM STATEMENTS



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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

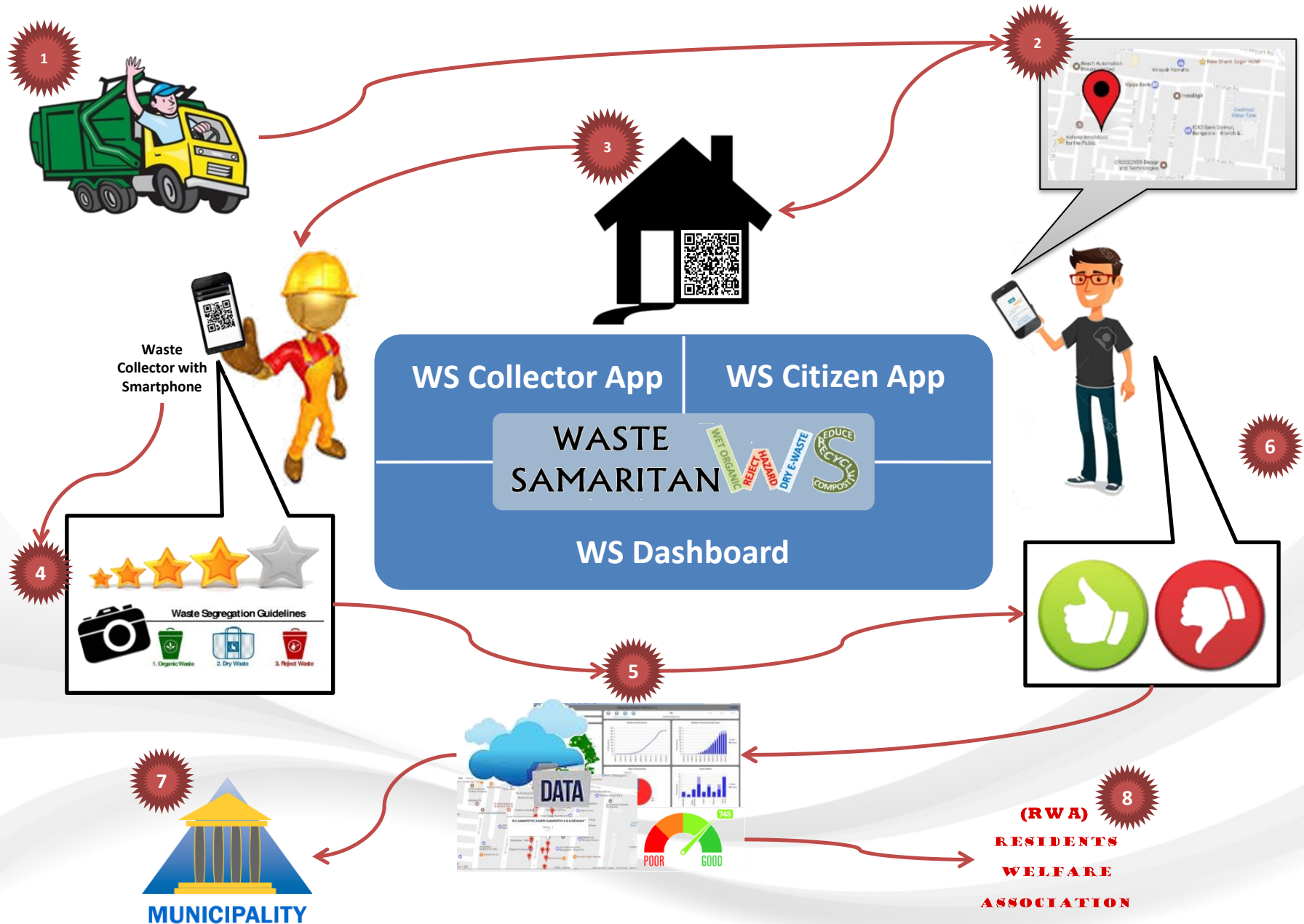
Environment ministry puts these draft rules on its **website**, seeking **public/expert/stakeholders** opinions within 60 days

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

**DATA
IS NOT
DIGITIZED /
AUTHENTIC!**

**DATA
IS NOT
FROM
SOURCE!**

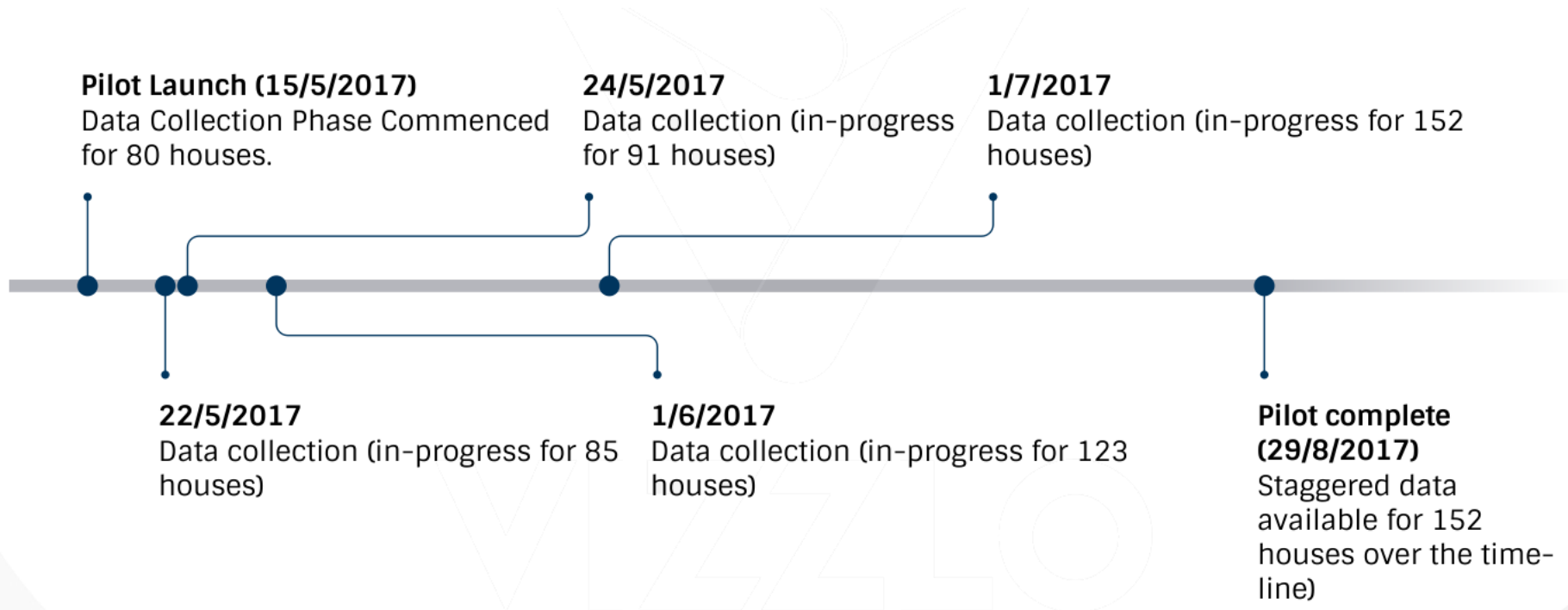
D2D COLLECTION & MONITORING SOLUTION



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

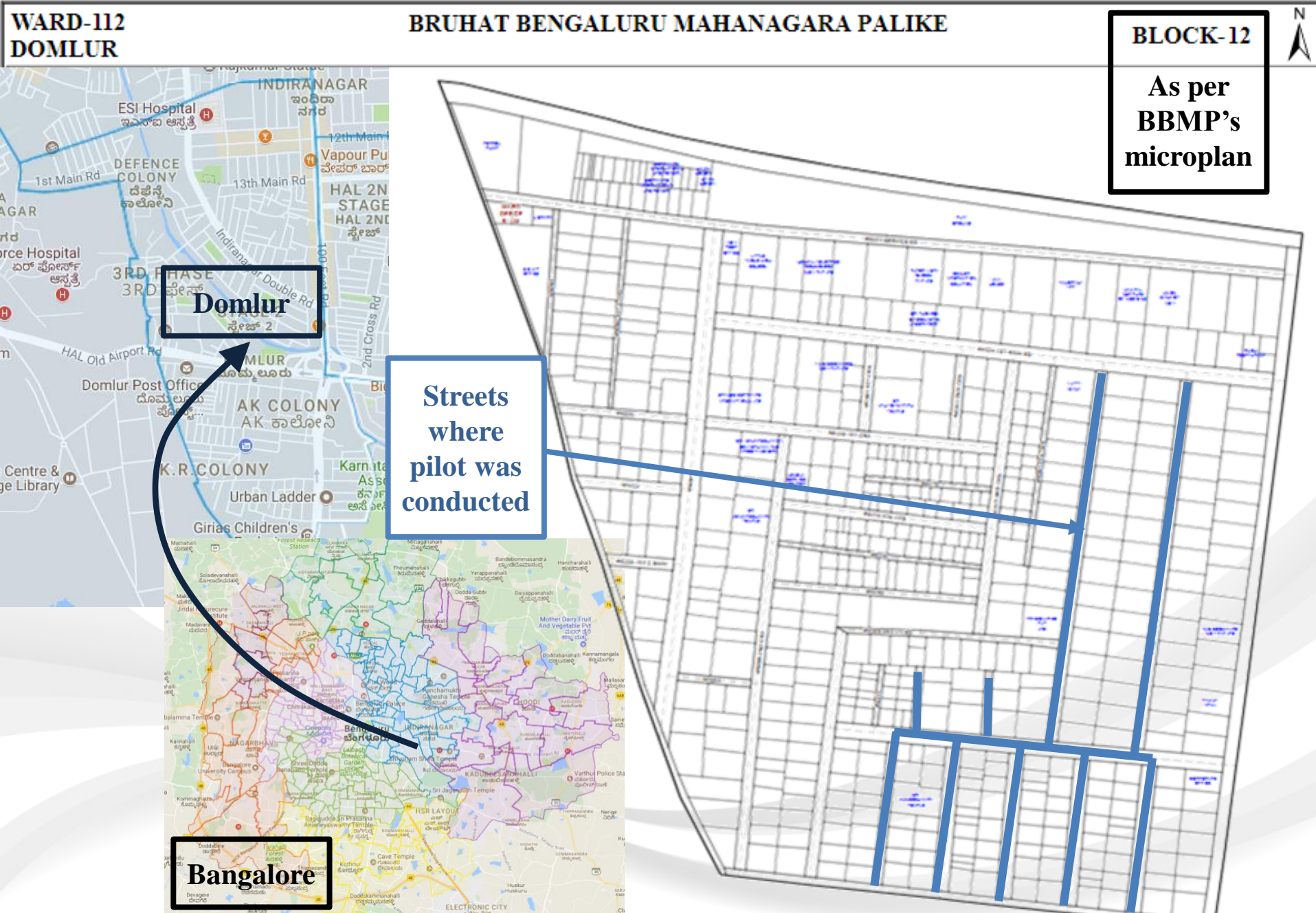


Pilot: Location, Timelines and IMPACT



- 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.

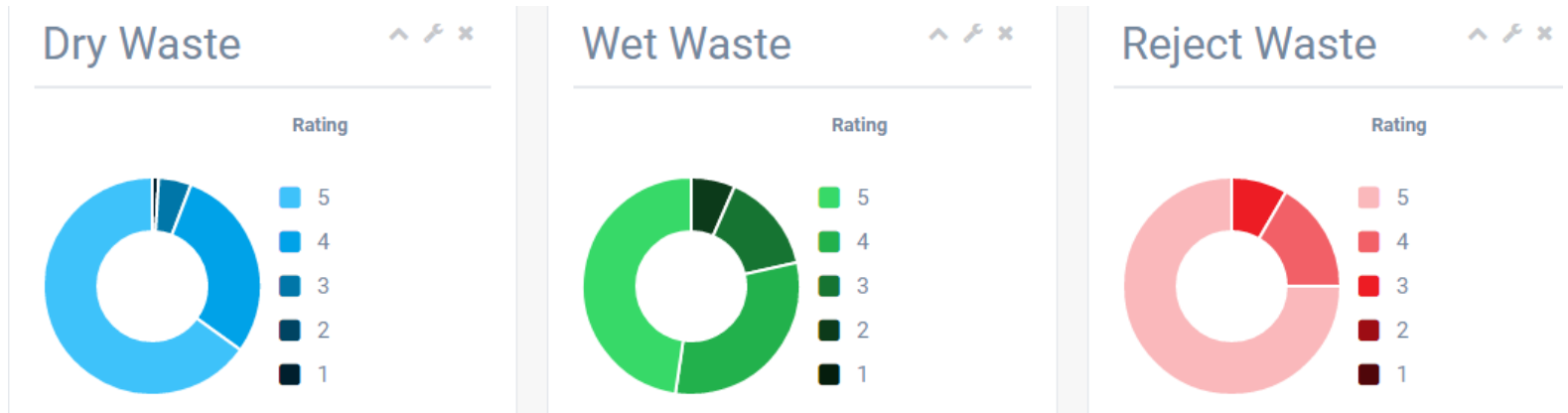
Pilot: Location, Timelines and IMPACT



Graph legends and their interpretation

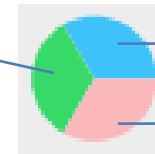
- **Green – Wet waste** | **Blue – Dry waste** | **Red – Reject waste**
- The shades further indicate the rating / quality of segregation of that category of waste.

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

Wet Waste



Dry Waste

Reject Waste

-  **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



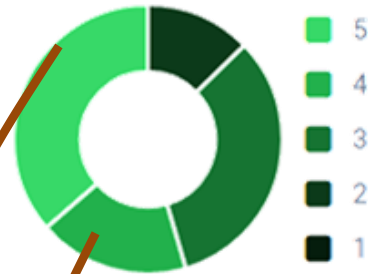
Rating



Wet Waste

May 17th, 2017

Rating



Reject Waste



Rating

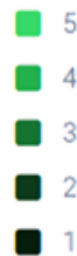


A c r o s s 8 0 h o u s e s

Rating



August 2nd, 2017



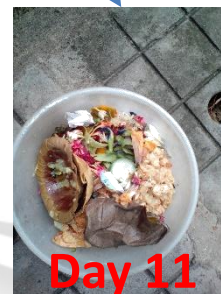
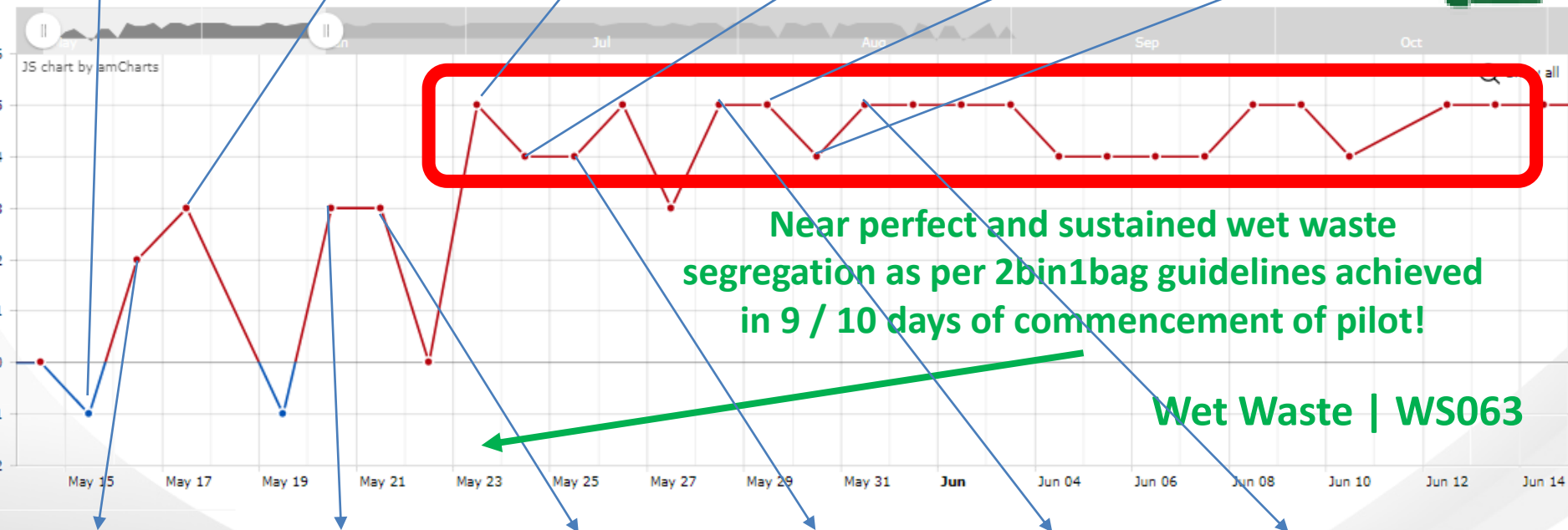
Rating



A c r o s s 1 5 2 h o u s e s

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!*



Pure organic waste in a bin without using plastic linings



Case : Onus on owner to ensure tenants segregate

Property Summary of (WS060)

BBMP ID	1
PropertyID	WS060
Owner Name	B Manjunth Naidu
Phone	9595226813
No.of Bachelor	1
No.of Family	3

Un Segregated



Dry Waste



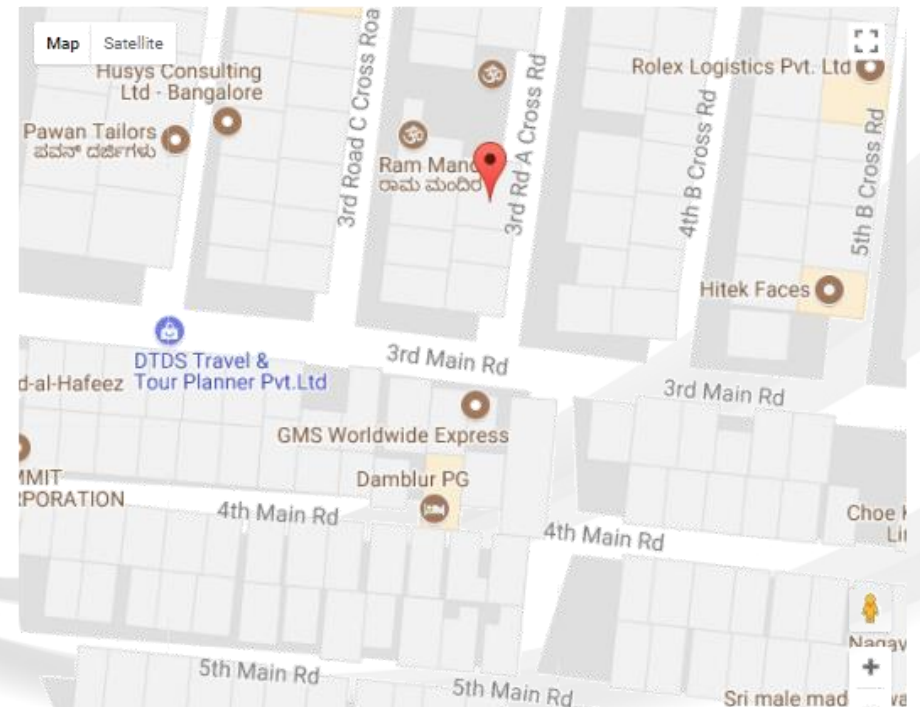
Reject Waste



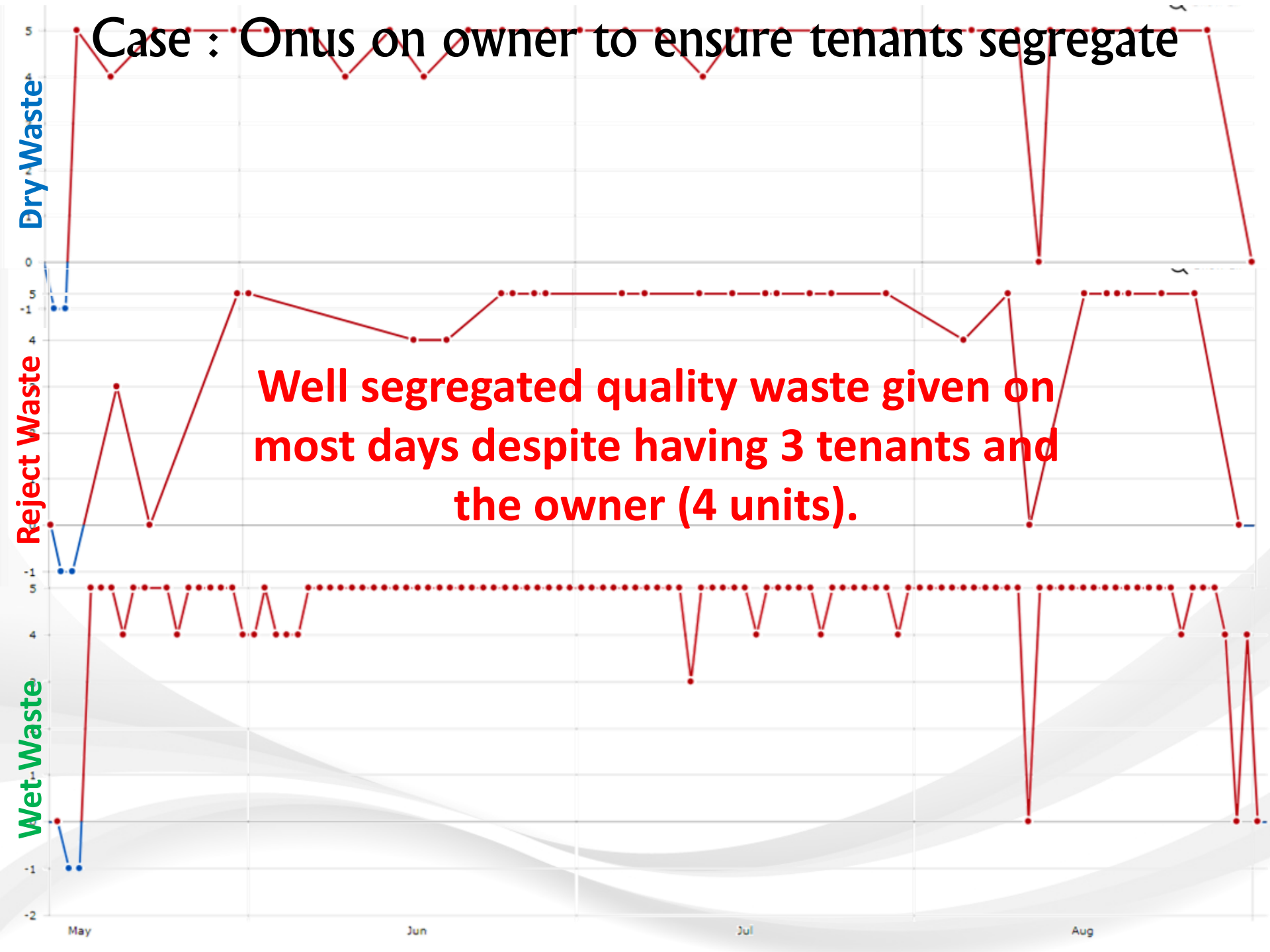
Wet Waste



No Waste

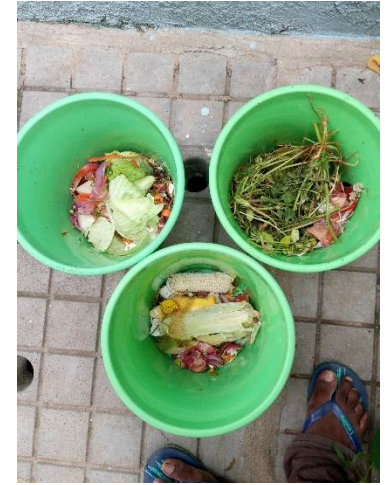


Case : Onus on owner to ensure tenants segregate



Case : Onus on owner to ensure tenants segregate

Wet Waste | WS060

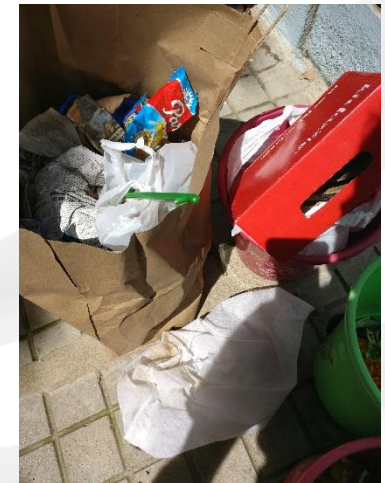


Owner ensured all tenants segregated wet waste without using plastic linings.

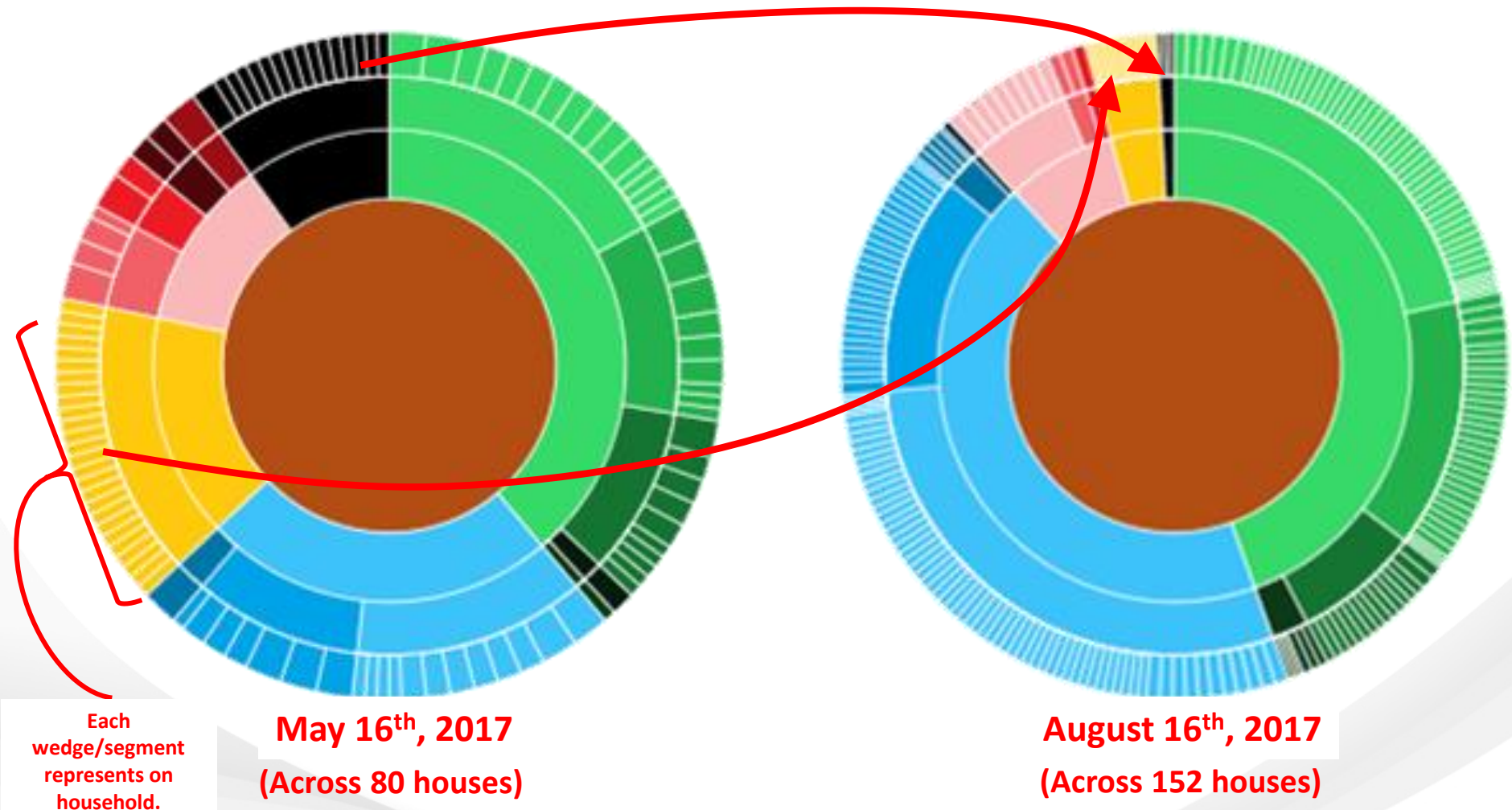


Clean dry waste was given out in bags without any mixing

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



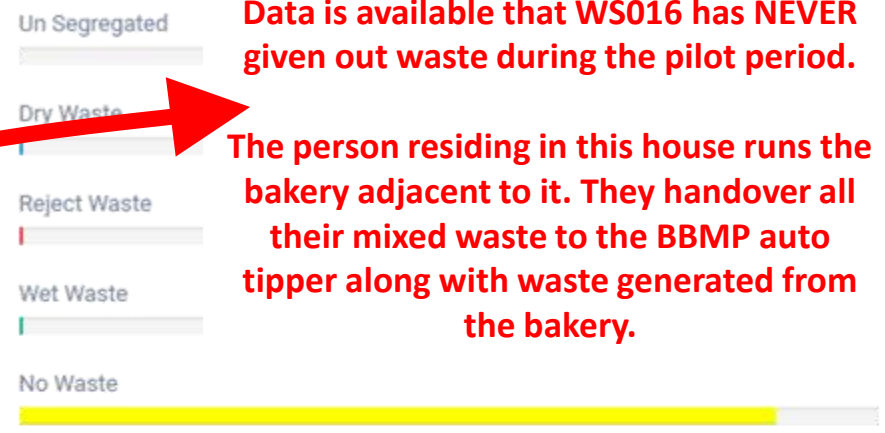
Data Drill – down to identify non-compliance



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

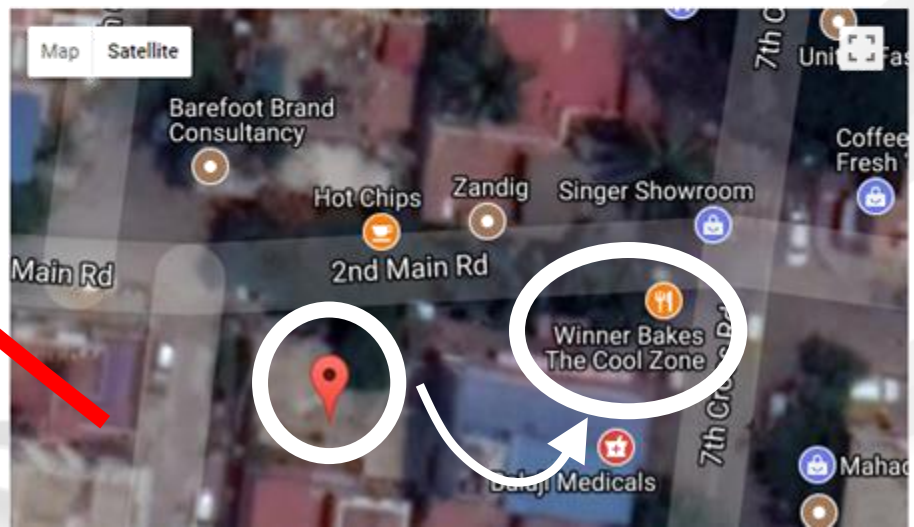
Property Summary of (WS016)

BBMP ID	14000000000000000000
PropertyID	WS016
Owner Name	Not Available
Phone	Not available
No.of Bachelor	0
No.of Family	1



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.



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

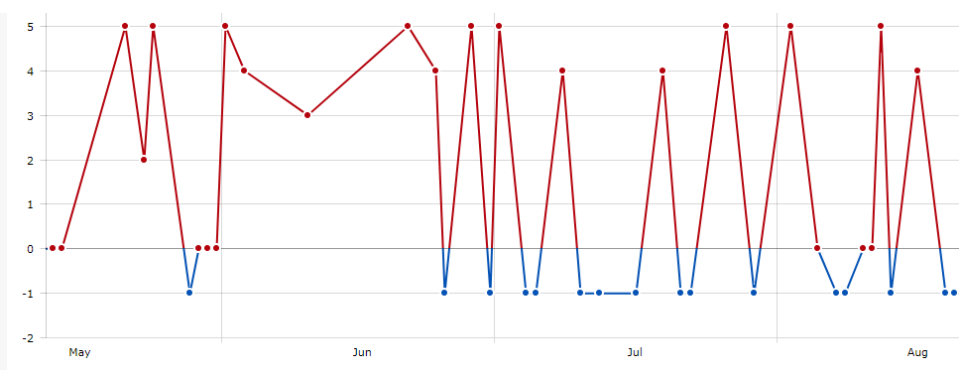
Either no waste was generated or some of the garbage bags in the vacant site are being thrown here from across the road by residents of WS065.

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

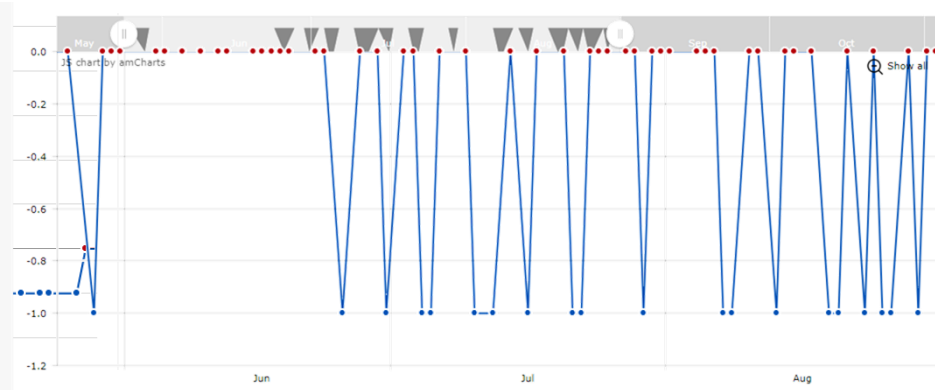


Case : Evidence for identification of non-compliant households & Plausible sources of blackspot generation

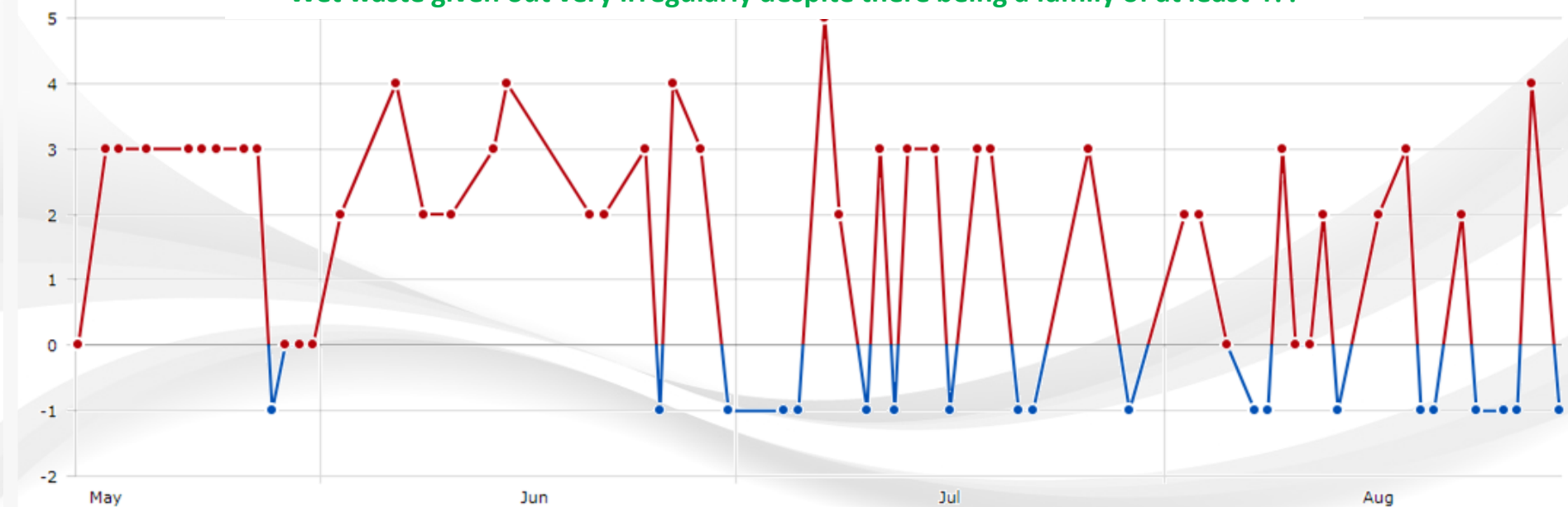
Dry Waste given out at regular intervals



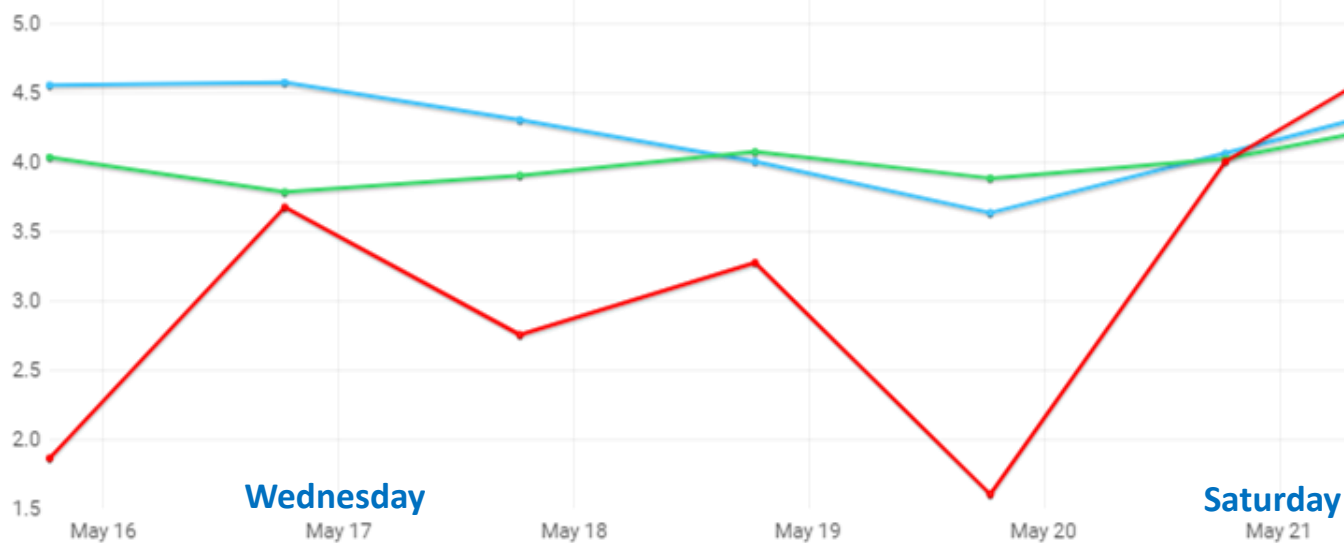
Reject Waste - never; Unsegregated waste - mostly



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



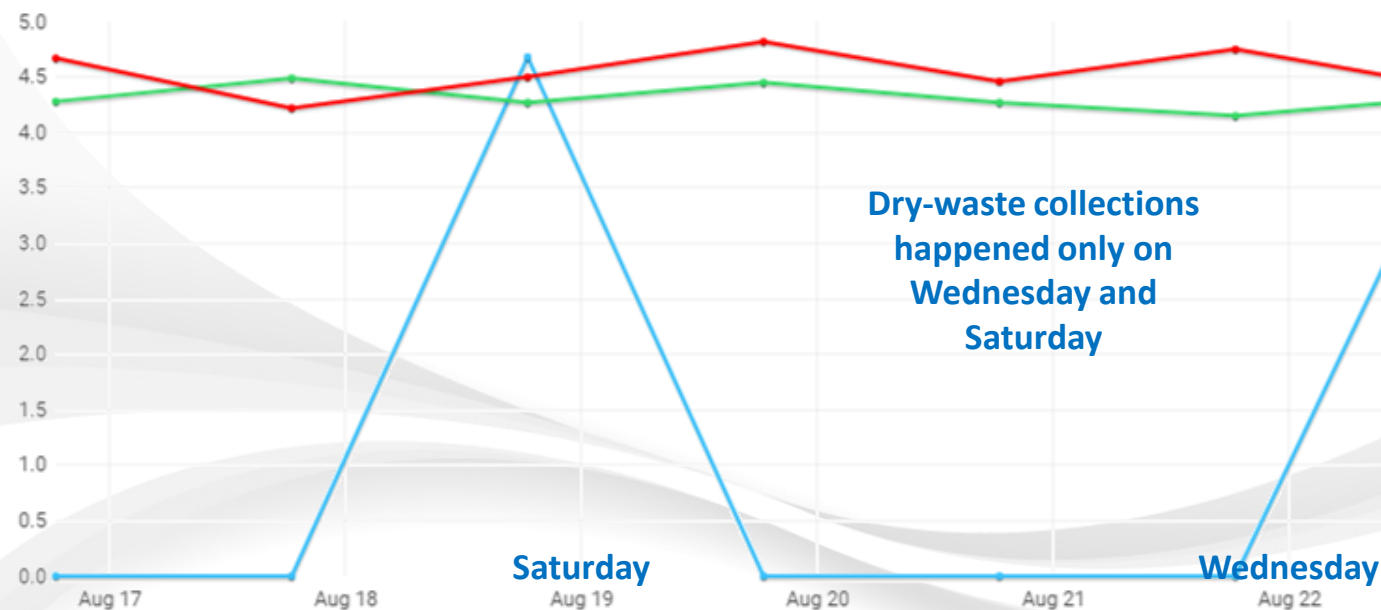
Average segregation quality across all households versus days of collection



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.

Beginning of pilot

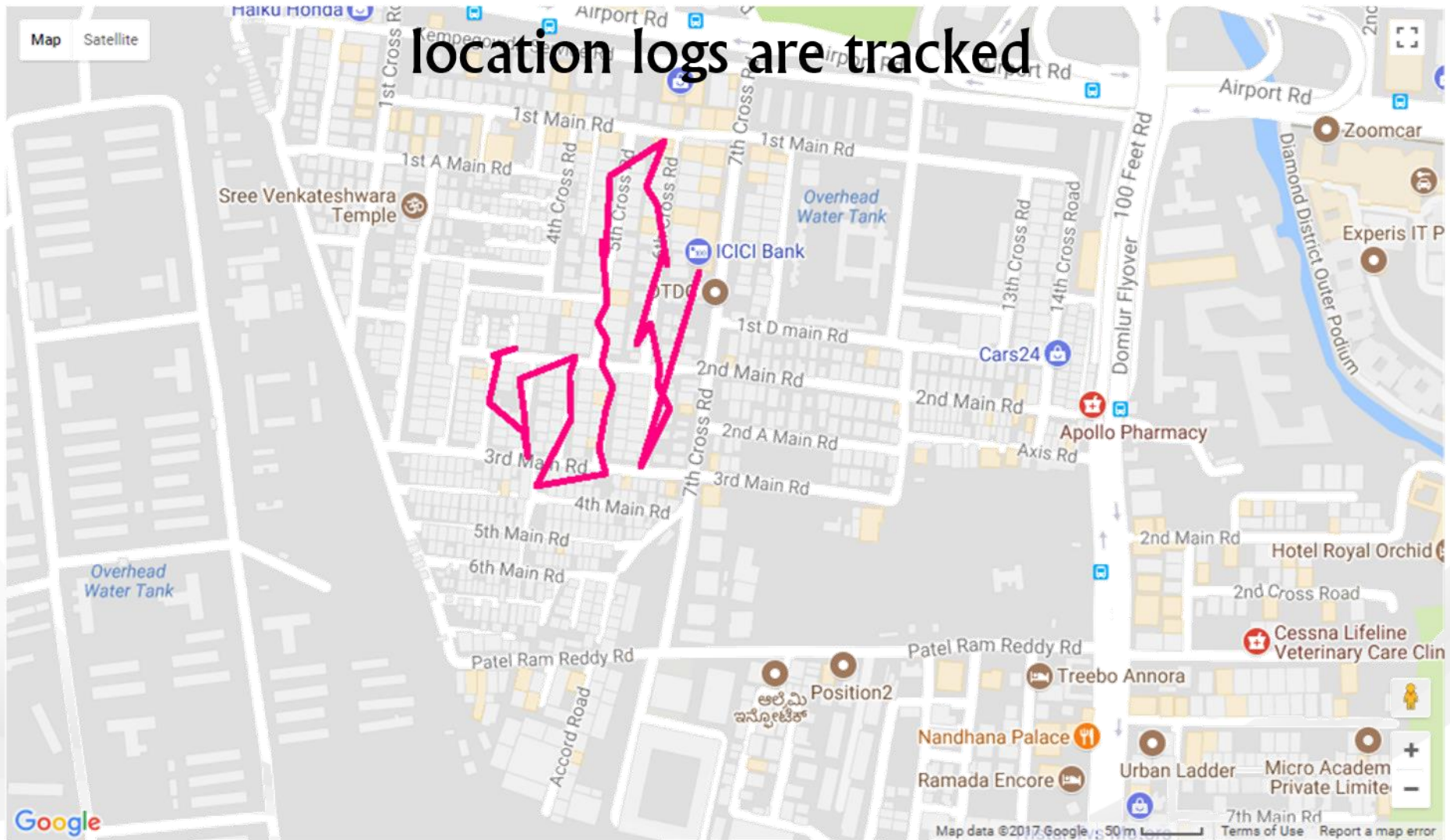


Improved quality in reject waste segregation also resulted in better quality of segregation across other categories. This drastically brought down the quantity of reject waste to 1/3rd.

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

Towards end of pilot

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.



Partnership with TAICT



ECOGRAM

The Anonymous Indian
Charitable Trust (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

One amongst 9 finalists out of 170 solutions pitched

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



22-24 October | Kuala Lumpur Convention Centre

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