Illegal Dumping / AI / Drones

A Case Study of Bayview San Francisco

Brian Johnson
April 20th 2023

Brian Johnson
About Me

Father & Husband

Volunteer,

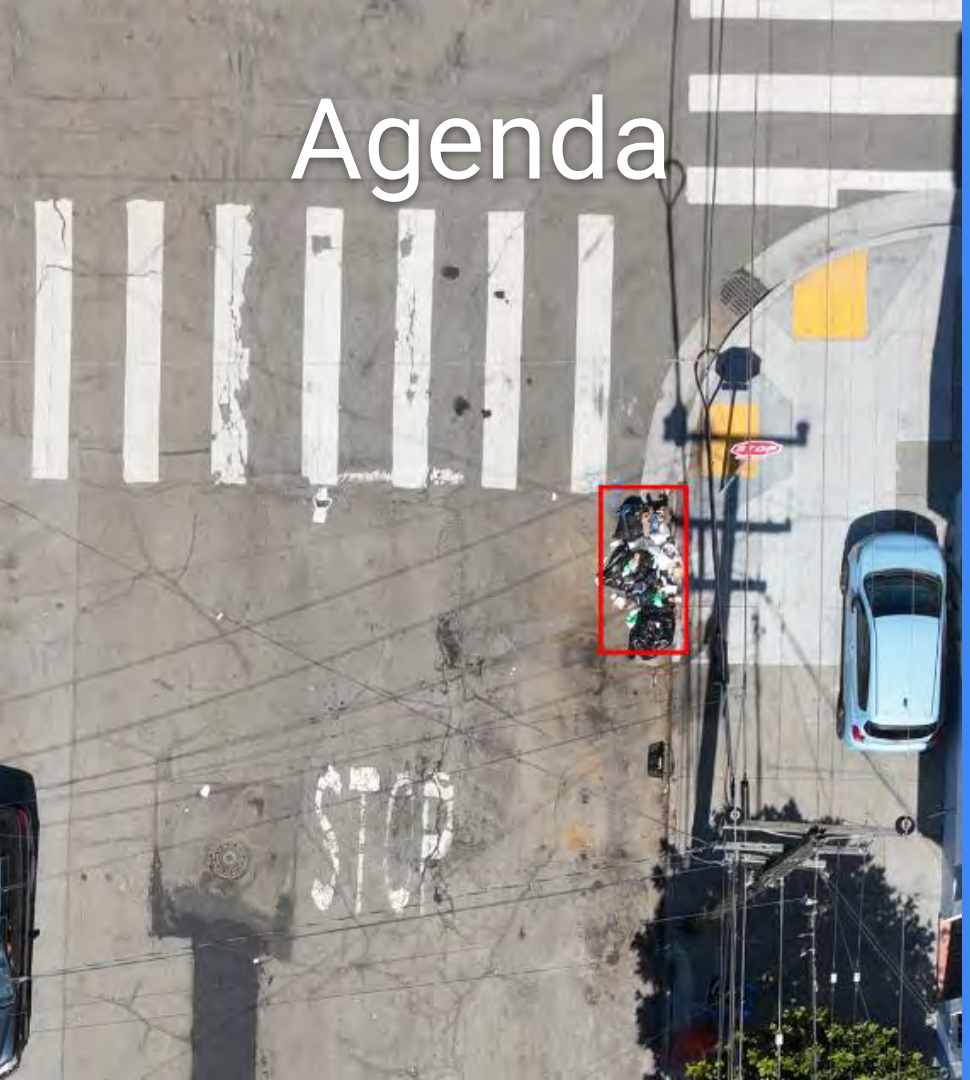
Computer Engineer w/ 2 decades

A partner for

solving illegal dumping

We can solve illegal dumping.

Agenda



- Why you, why now?
- What? Solve ID
- How? Drone + AI = Data
- Learning? consistent = cleaner
- A call to action: Consider us
- Q&A (15 minutes)

Why you Brian?

STOP

Education
Eradication
Enforcement

Waste on streets

Drone flies

AI detects waste

Agent reports 311

311 routes to, and DPW picks up

Clean

play the video…

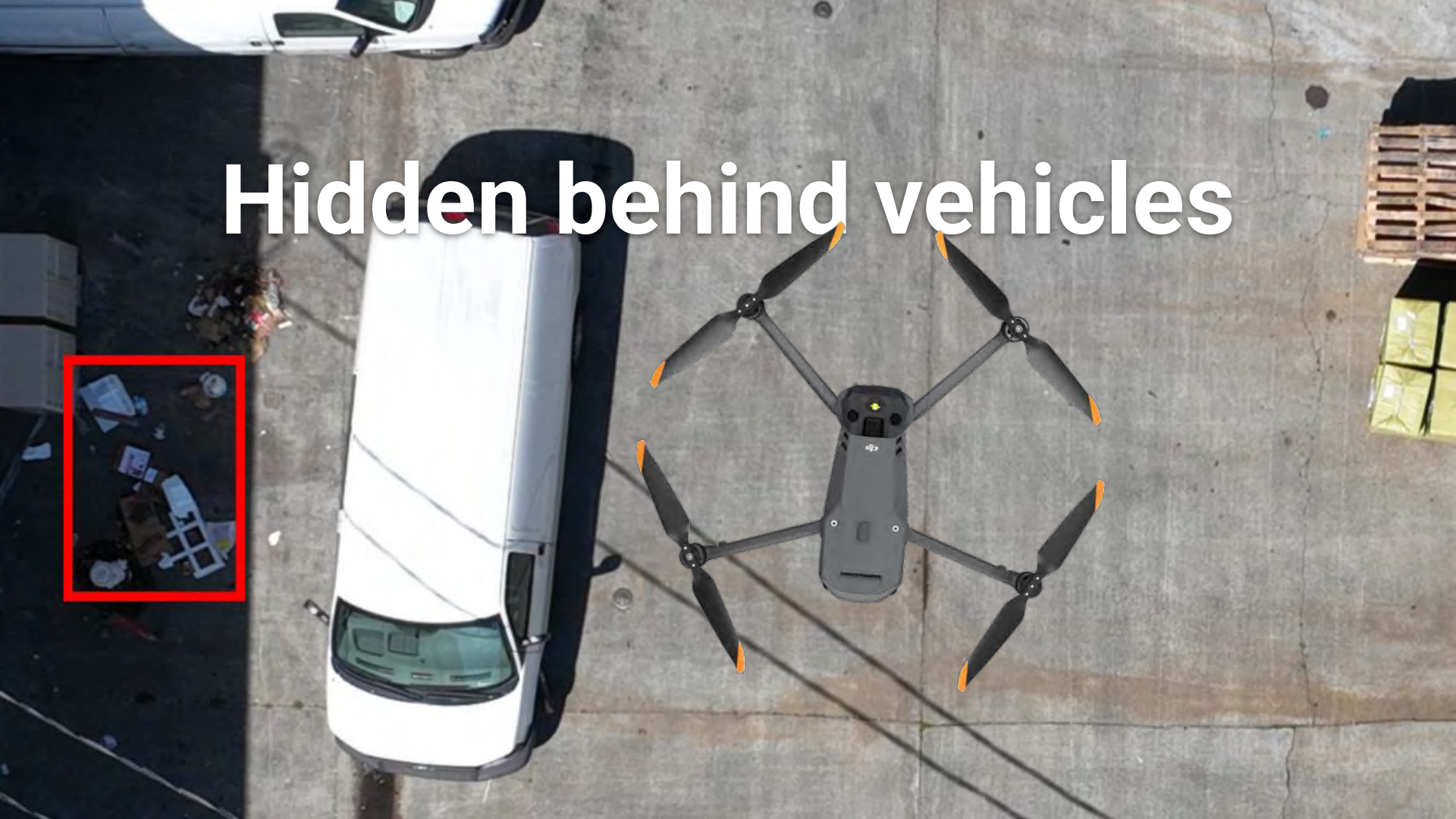
A remote location (½ mile)

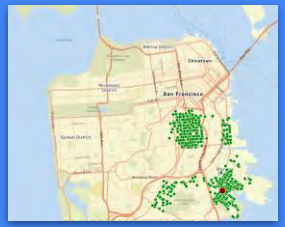
Away from road

Large dump sites

Bags and loose debris

Hidden behind vehicles



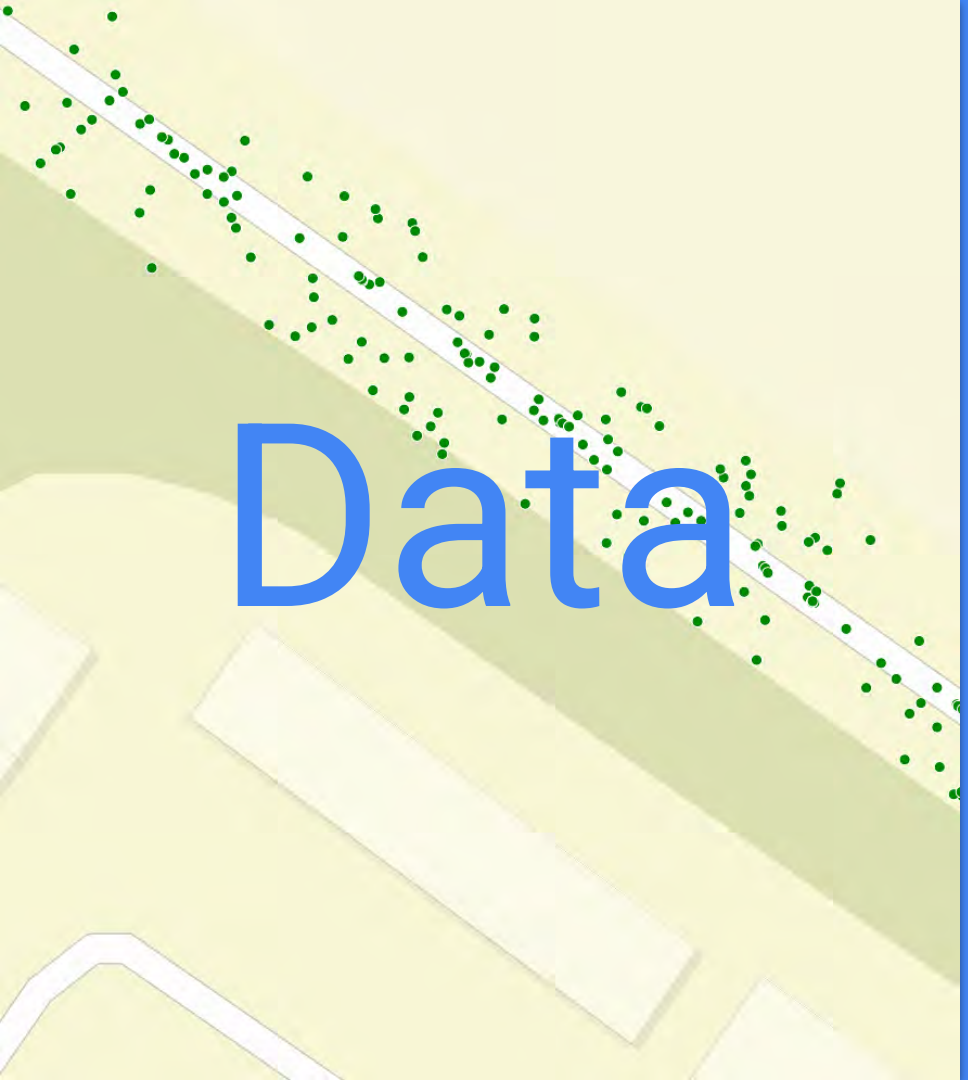


Dump sites near my home

me

waste

Man that’s a lot of waste,
but what are those green dots
and red boxes?



Data

- Where are all dumpsites?
- How much volume?
- What is being dumped?
- When?

With **good data**, you **can** (correctly) answer these questions.

Detect, measure, describe, and report.

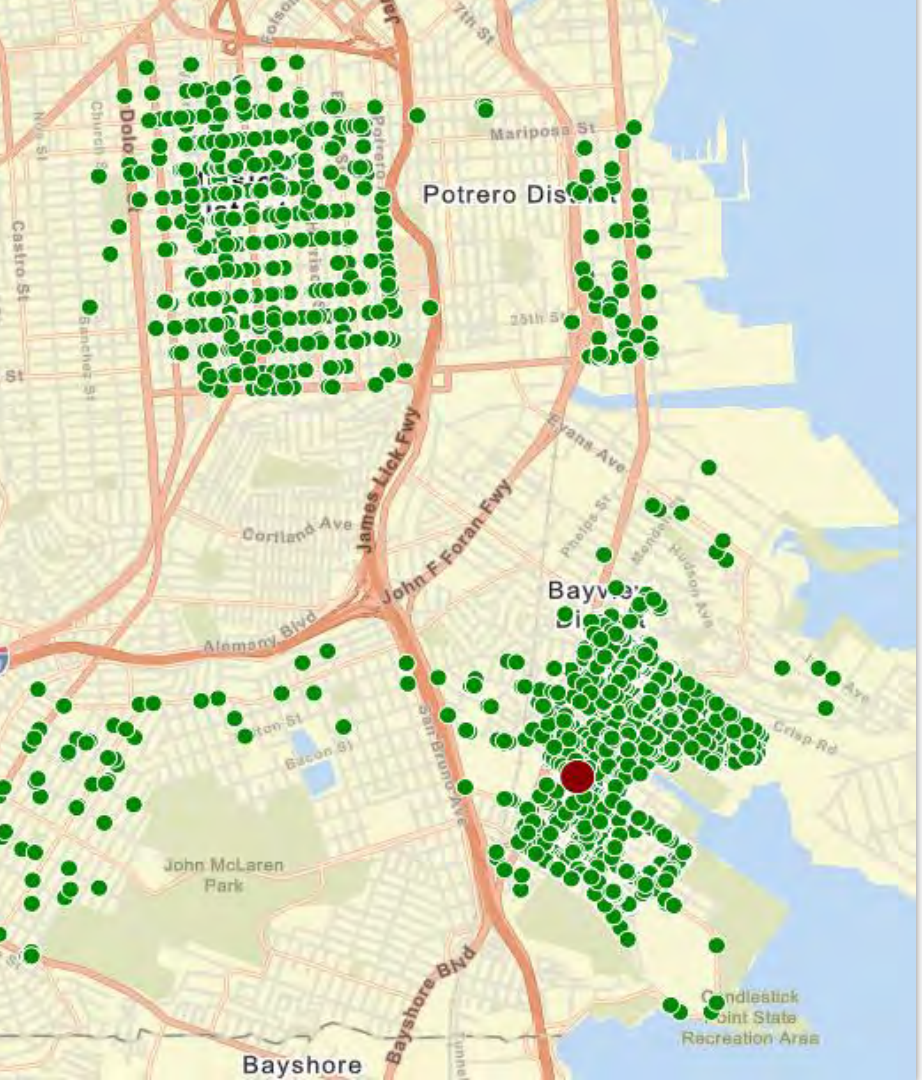
SF311 View Requests Learn More

Street or Sidewalk Cleaning at San Francisco

CLOSED Case Transferred. packer size load at this location. - 3 days ago #16667055

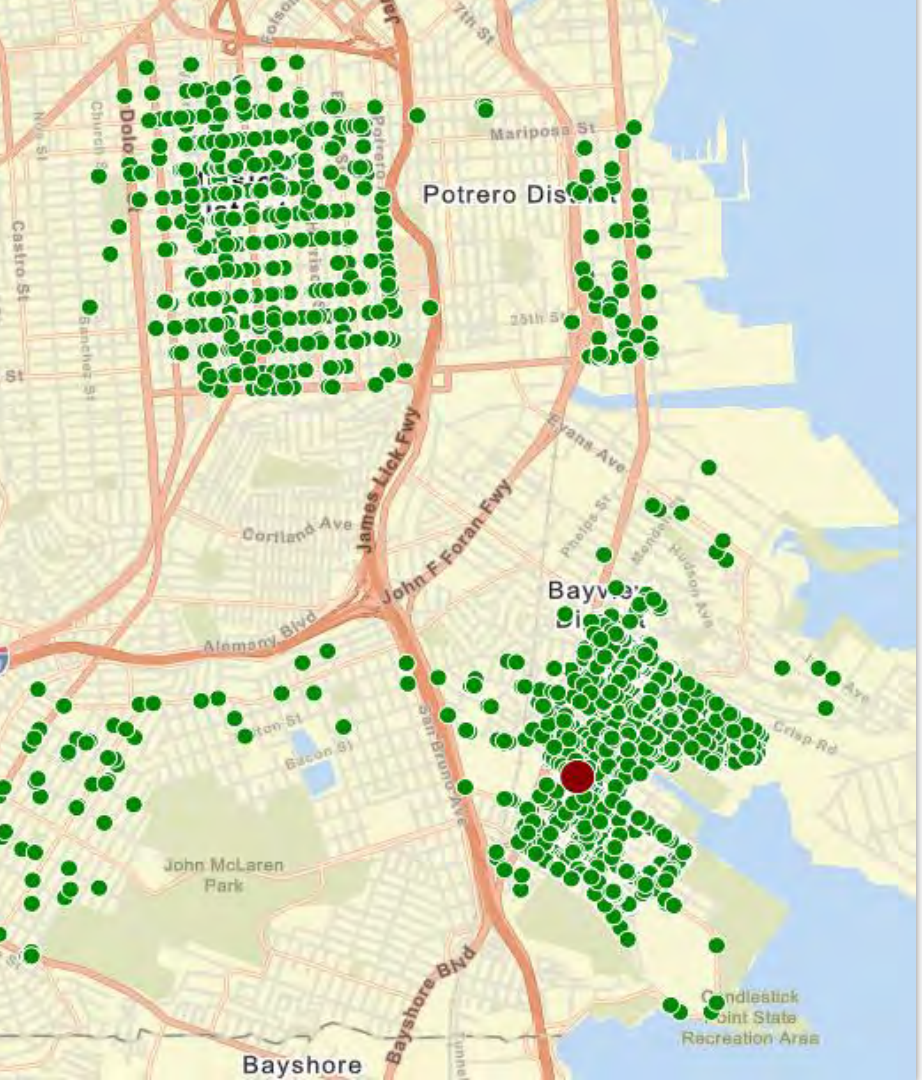
more than a truckload on the road, containing, mattress, garbage bags, loose debris, furniture, construction debris, appliances, cardboard boxes, pallets

One drone and one pilot.



A single pilot can collect data for this entire area in 3.5 hours!

How?



80 miles,

32 miles/hour

2.5 hours

Mavic 3 enterprise can cover
1 square mile in 30 minutes
on a single battery.

Automation Means Efficiency

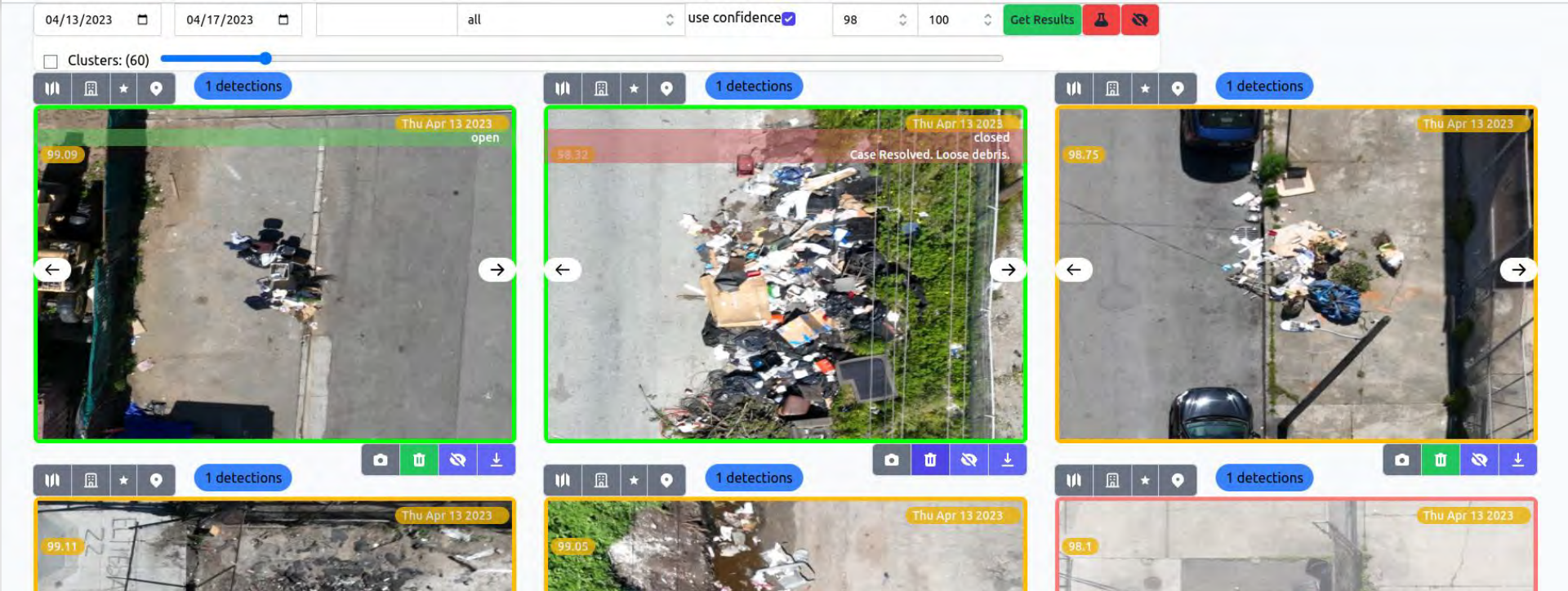
Flight programming / automation

Machine vision + automation

Flight path and photos are pre-programmed

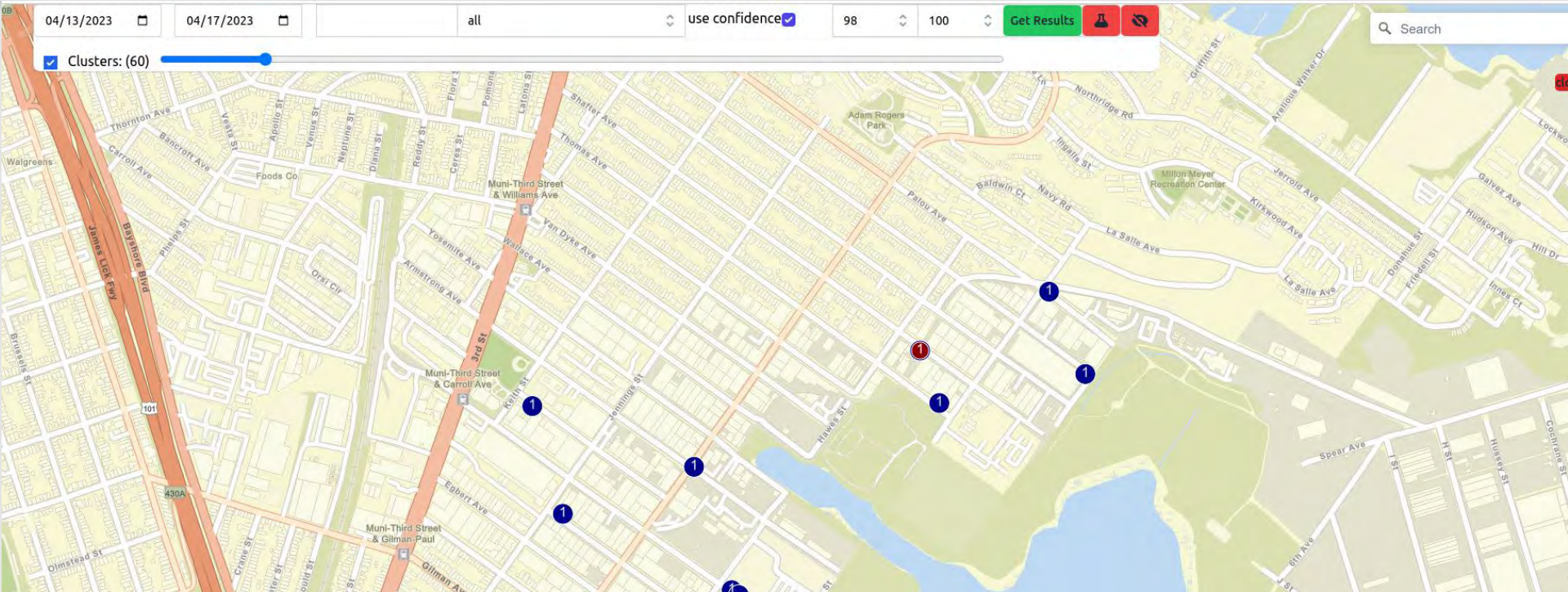
Machine vision finds waste

Locates, crops, presents



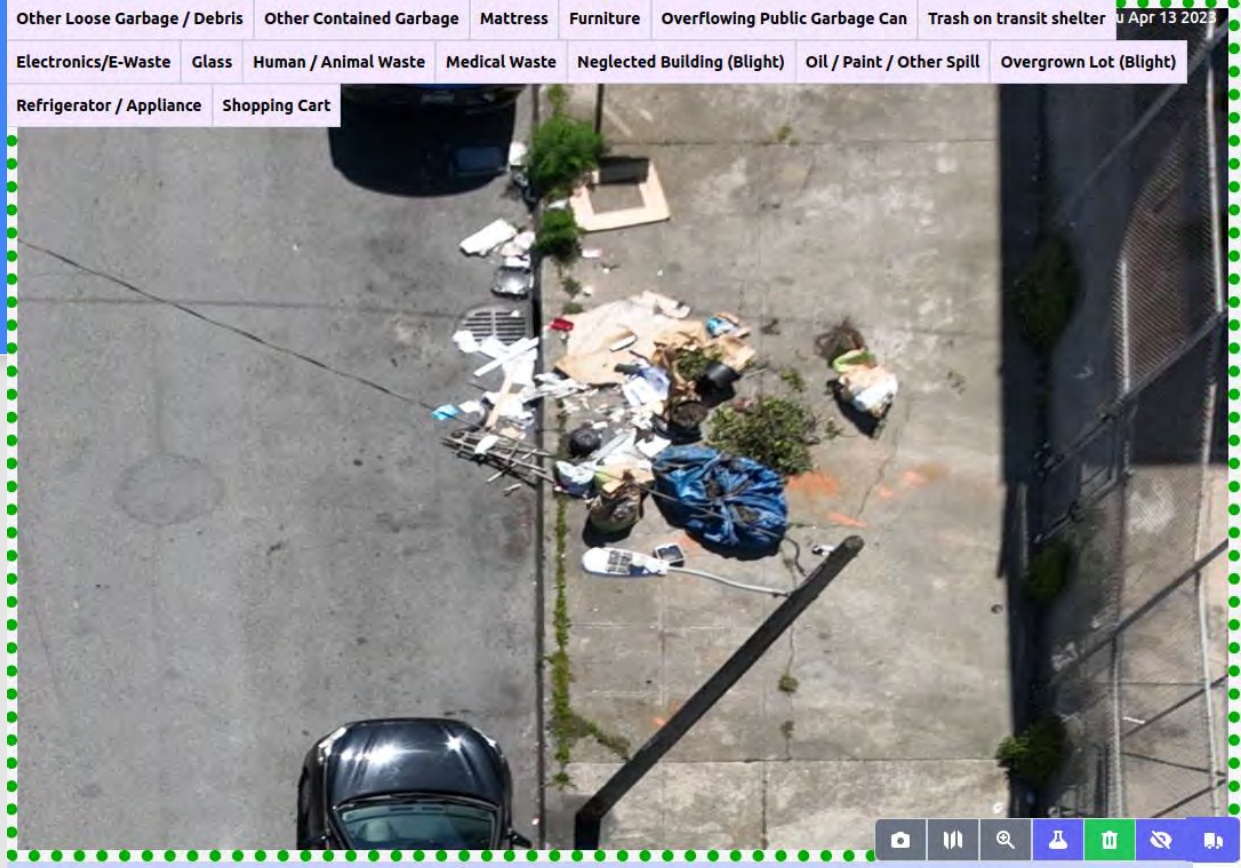
Operator can see waste

Clustered, deduplicated, and mapped



Waste is reported

Photo is cropped
GPS calculated
Description
Reported to 311



a small pile containing | a medium pile containing | a large pile containing | more than a truckload containing | mattress | garbage bags | loose debris | toxic waste | furniture | construction debris | appliances | cardboard boxes | pallets | blocking handicap access | behind barricade | in tree well | near encampment | on the road | on the curb | on the sidewalk | by the city boxes | on the grass/field | by the power pole | by the sign post | by the fire hydrant | by the city garbage can | between parked cars | behind fence | touching building | touching fence | covering drain | near dumpster | full-photo

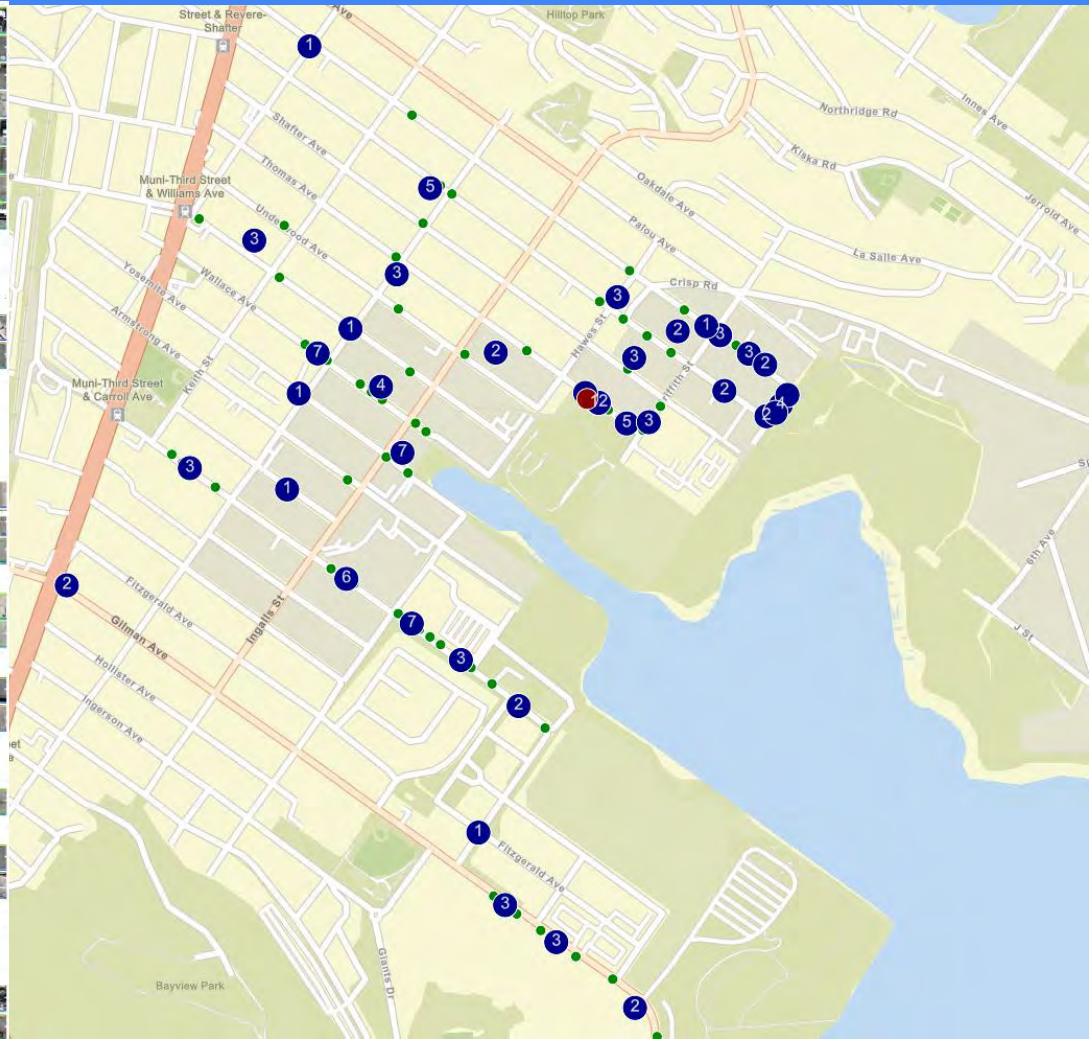
2 month Bayview case study

- **Context**: Bayview SF, epicenter of illegal dumping
- **Objective**: Report every illegal dumping site
- **Methodology**: One man, one drone, one application
- **Conclusion**: Continuous reporting changed my neighborhood

May 9th, 2022

(after a dozen flights over 3 months)

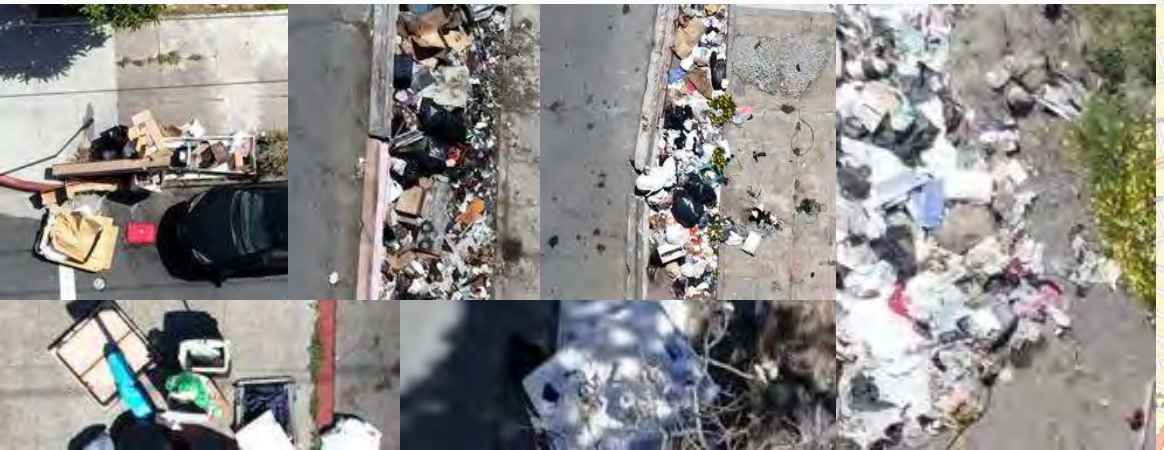
118 dump sites

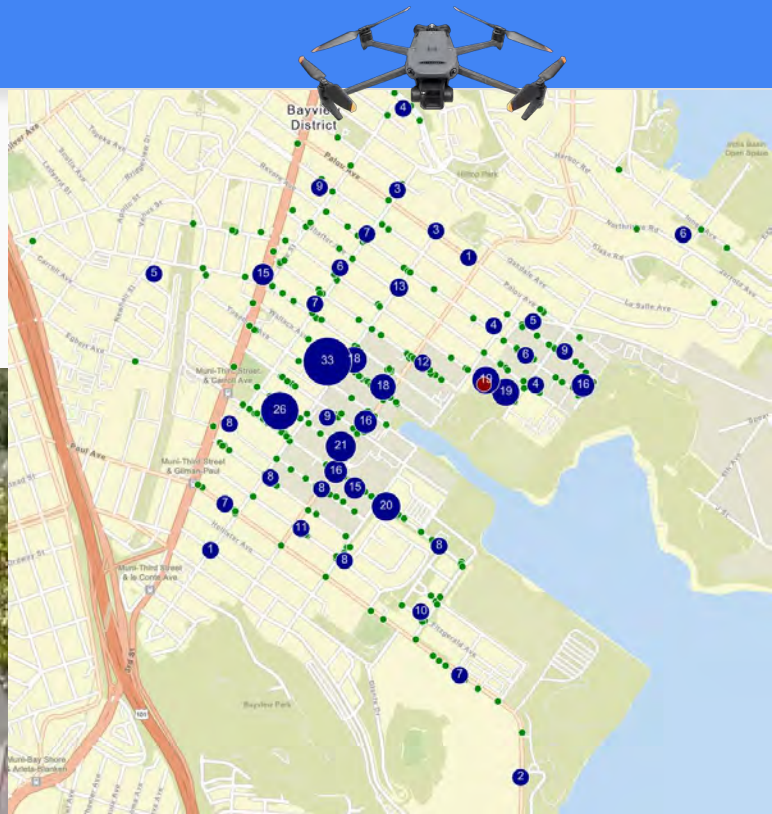


So, I reported every day for 26 days.

(26 days)
May 9th - May 24th

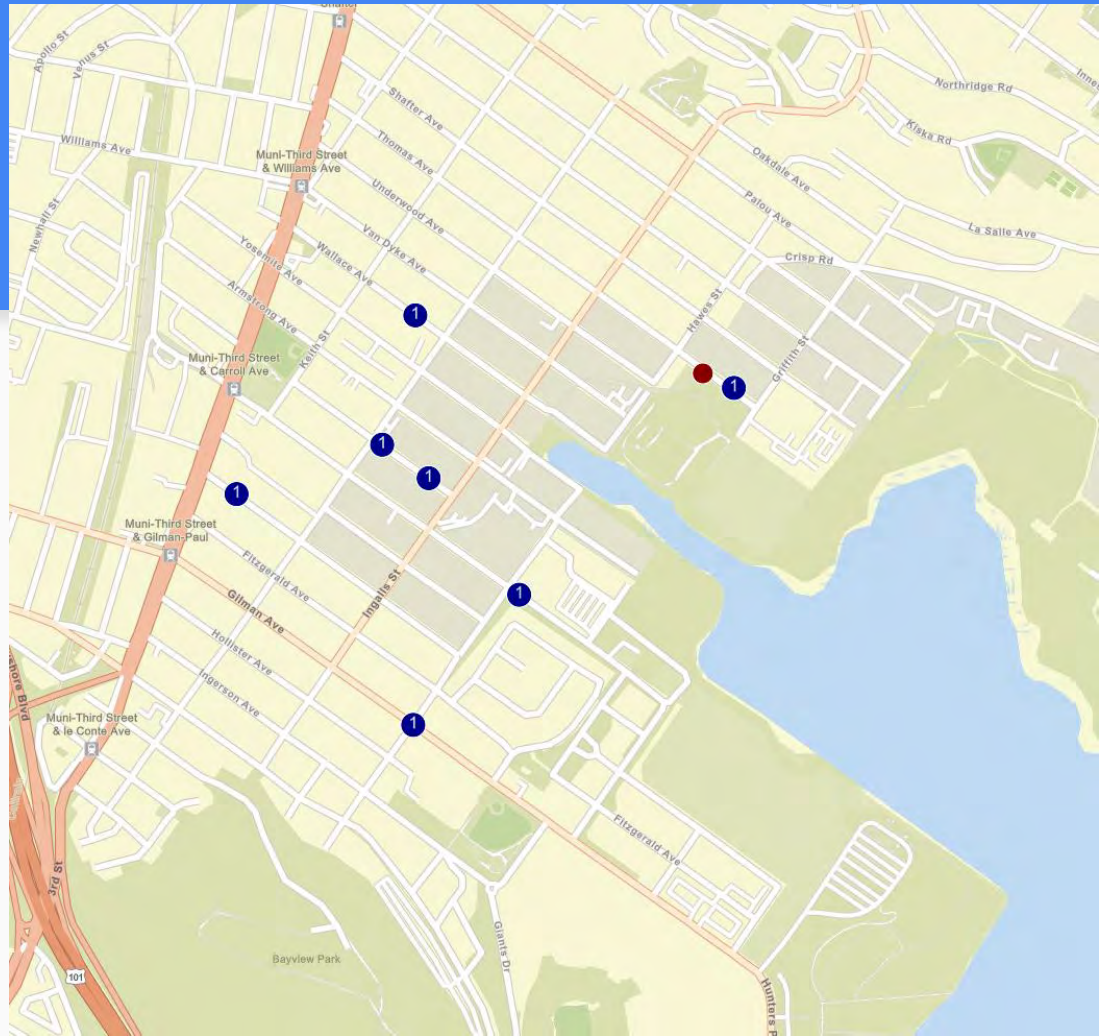
444 reports





May 24th, 2022

7 dump sites



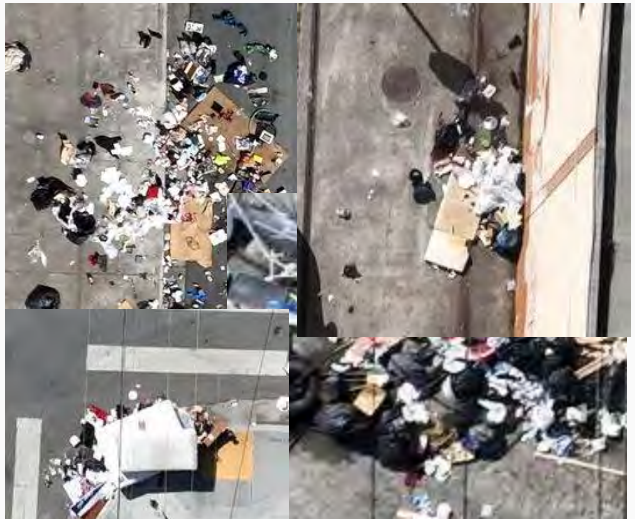
2 week break

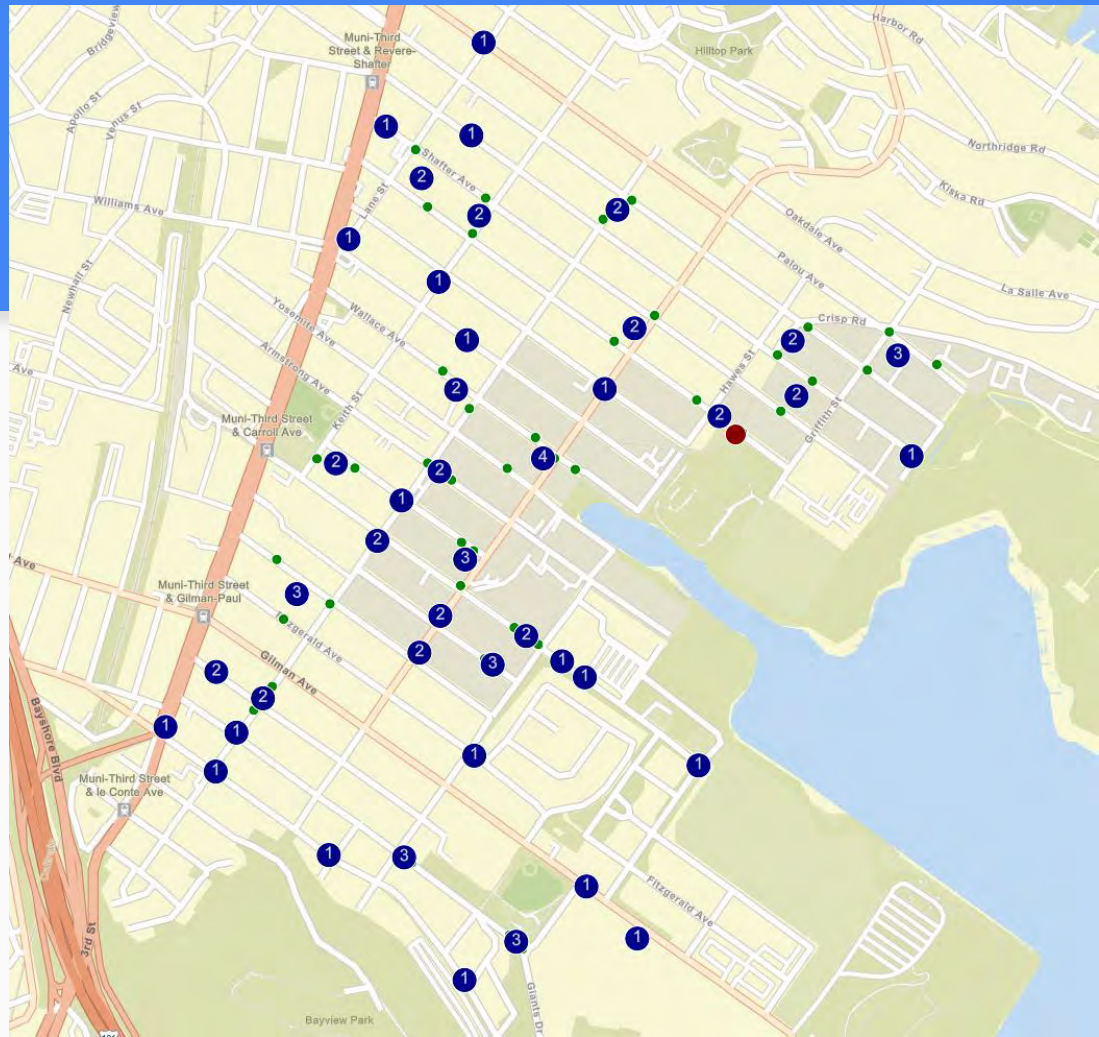
0 reports are sent to 311

…and when I got back…

June 6th, 2022

73 dump sites

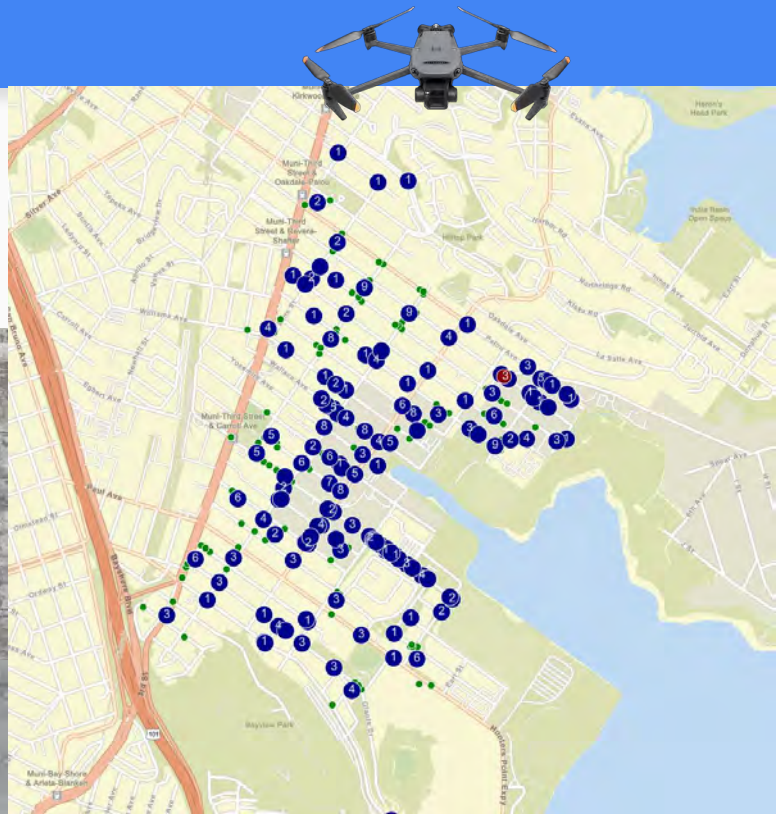




So, I reported every day for 24 days.

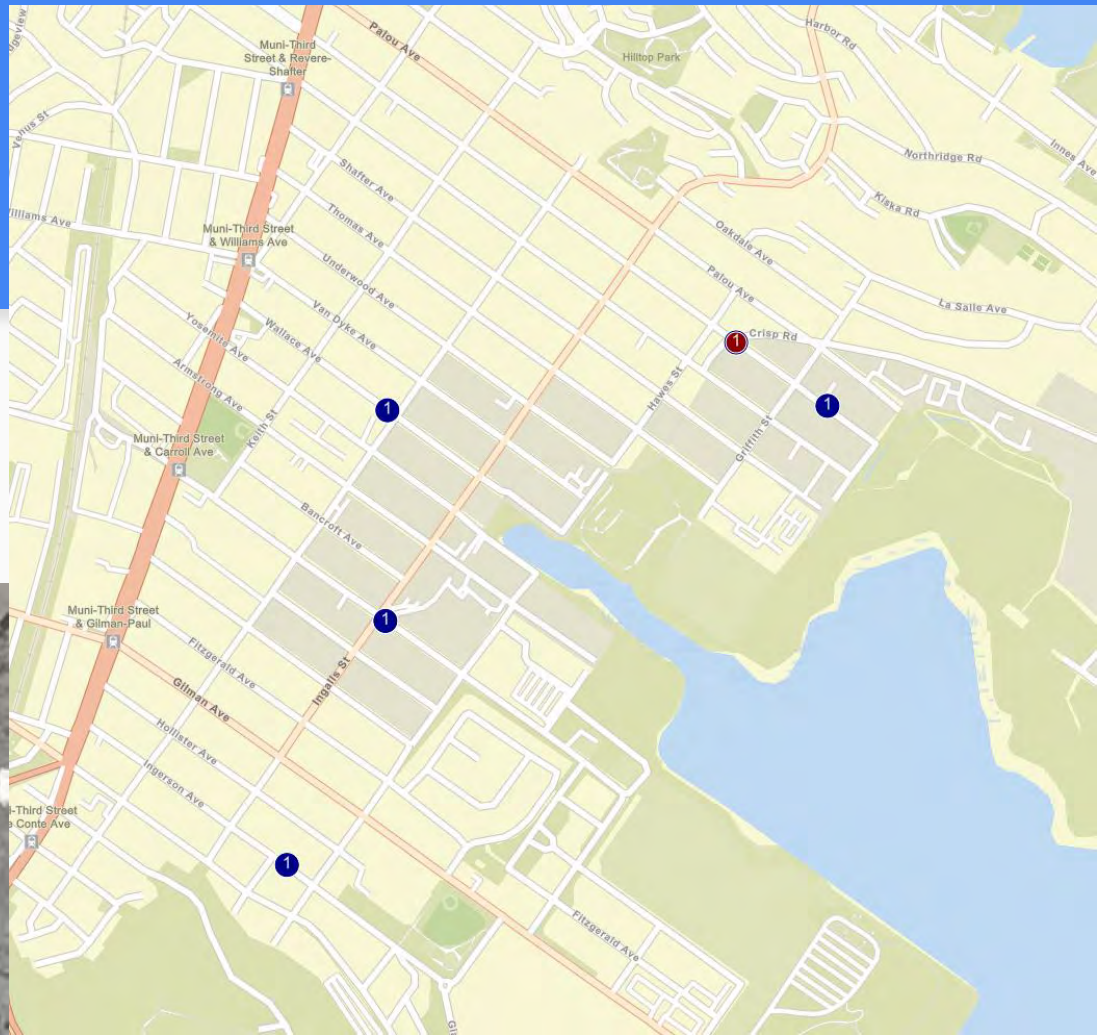
(24 days)
June 6th - June 29th

410 reports



June 29th, 2022

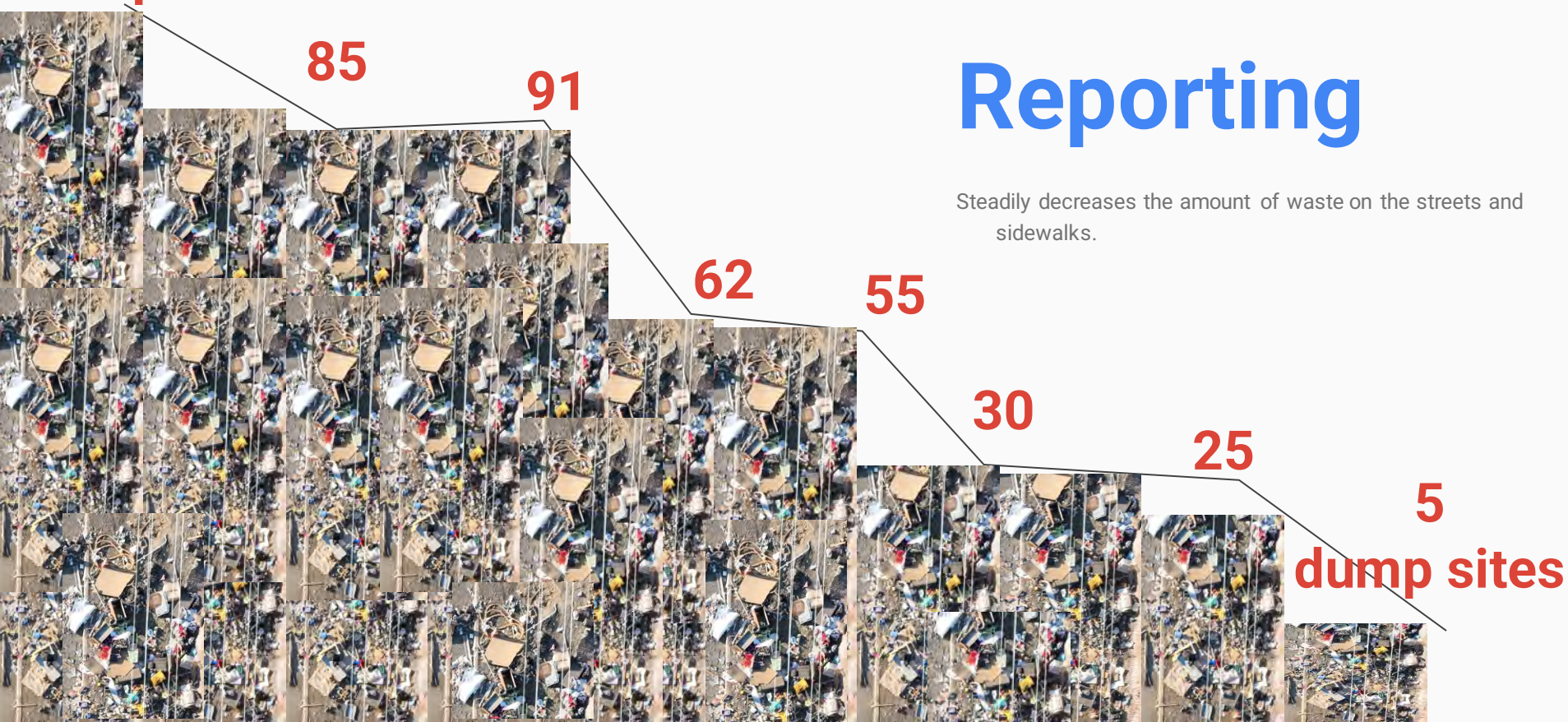
5 dumpsites



It’s steady improvement…

Continuous Reporting

Steadily decreases the amount of waste on the streets and sidewalks.



Bayview Dumpsites (one year)

4,441

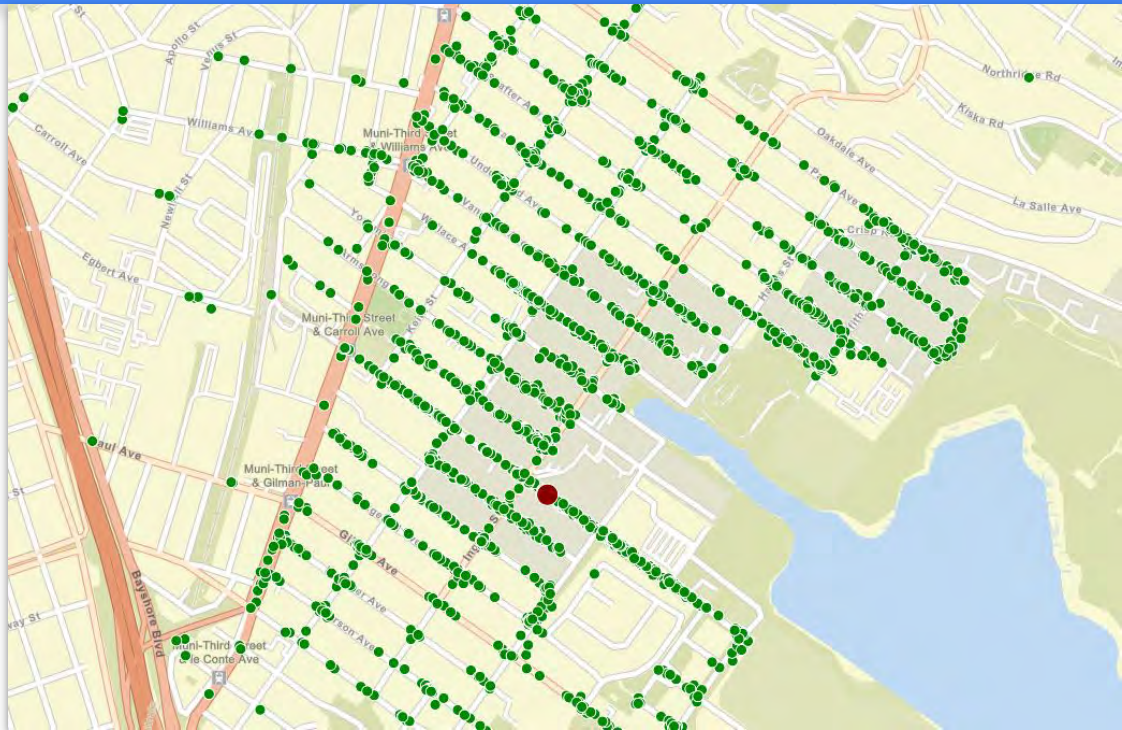
Dump sites (Bayview) in 1 year

3rd Street to Bay,
Jamestown Ave to Palou Ave

Bayview Neighborhood

District 10

San Francisco



Bayview, SF Case Study Results

- Number of illegal dumping sites May 9 - June 29 : 888 dumpsites detected and reported
- Types of waste found:
    a. furniture, loose debris, construction, household, mattress, bags, loose, automotive
- Areas with the highest incidence of illegal dumping
    a. Wallace Ave. / Jennings St.
    b. Carroll Ave. / Jennings St.
    c. Thomas Ave. / Griffith St.
- Actions taken to address the problem
    a. Every dumpsite reported to SF 311
    b. Every dumpsite cleaned up by DPW/Recology
    c. Working with SF 311 to provide better reporting capabilities

Why is this important?

Benefits

1600x as efficient **10x** as fast

36x Cleaner neighborhoods

Equity

Government **satisfaction**

Considerations

Develop technology

Logistics

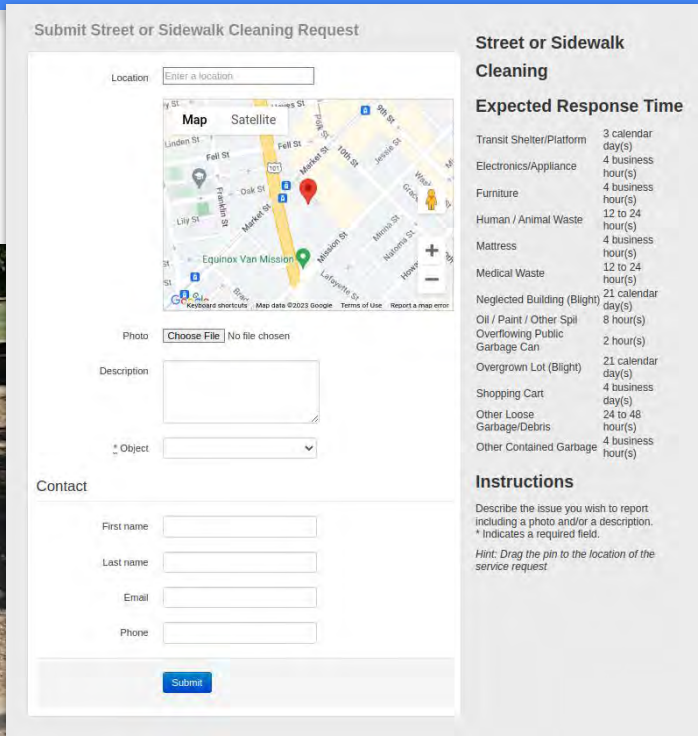
Privacy, PII, PI, Regulation

Why do you need this?

- Increase ground crew capacity and efficiency
- Improve ground coverage (**869** miles in SF)
- Gain valuable information and insights

Not replacing Community

- Public awareness campaigns
- Community engagement and reporting



Submit Street or Sidewalk Cleaning Request

Location: Enter a location

Map Satellite

Equinox Van Mission

Photo: Choose File No file chosen

Description

* Object

Contact

First name

Last name

Email

Phone

Submit

Street or Sidewalk Cleaning

Expected Response Time

Transit Shelter/Platform	3 calendar day(s)
Electronics/Appliance	4 business hour(s)
Furniture	4 business hour(s)
Human / Animal Waste	12 to 24 hour(s)
Mattress	4 business hour(s)
Medical Waste	12 to 24 hour(s)
Neglected Building (Blight)	21 calendar day(s)
Oil / Paint / Other Spil	8 hour(s)
Overflowing Public Garbage Can	2 hour(s)
Overgrown Lot (Blight)	21 calendar day(s)
Shopping Cart	4 business day(s)
Other Loose Garbage/Debris	24 to 48 hour(s)
Other Contained Garbage	4 business hour(s)

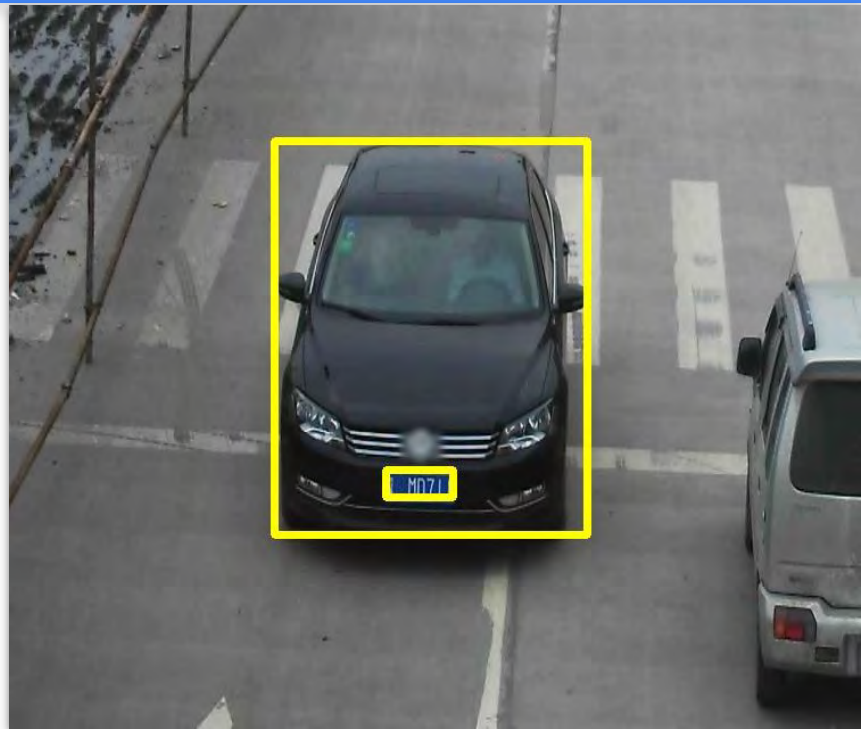
Instructions

Describe the issue you wish to report including a photo and/or a description.
* Indicates a required field.

Hint: Drag the pin to the location of the service request

Not replacing Surveillance Cameras

- Surveillance cameras and monitoring
- Strict enforcement and penalties



Not replacing Trucks and Crews

- Waste disposal infrastructure

Conclusion

- Consistent dumpsite reporting leads to cleaner neighborhoods
- It’s cost effective, fast, and reliable to use Drones and AI
- This technology gets better every week
- Good data helps officials, departments, and communities.
- Every city should be looking at this technology

Q&A

Comments, Questions?

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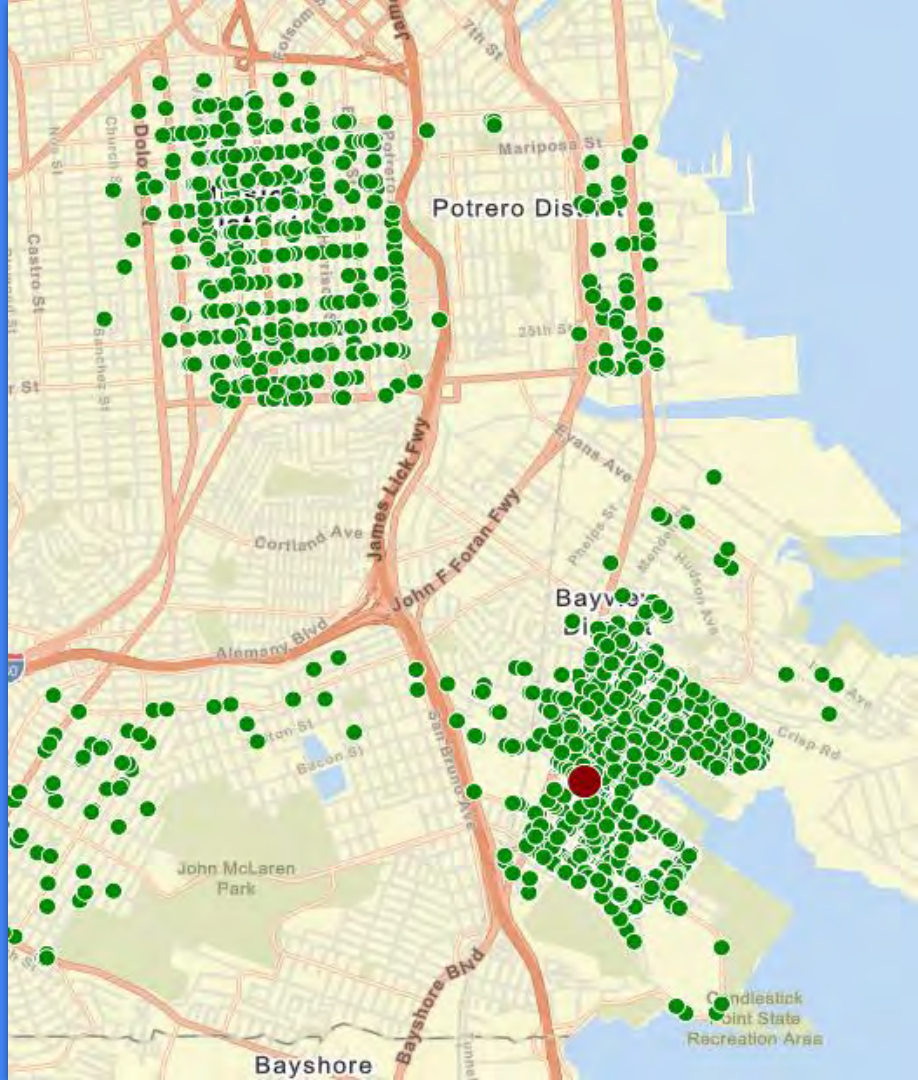
March 22nd-now
125 missions
117,793 photos
5100 detections
4376 reports