

Using air modelling software to track down the source of offensive odours

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What am I telling you?

- The problem of tracking down sources
- How the tool works
- How we've applied it in our work
- What we've found while using it

First, Canterbury



Headlines from the media

Bad smell in north
Christchurch a mystery

Factory smell makes
resident want to vomit

Timaru residents still
complaining about
offensive 'fish' odour

Investigation still going into source
of gas odour in Christchurch

Smelly rest home a 'health hazard'

Living Earth compost
plant causes stink

Pollution Hotline calls about air quality

- ~6000 calls a year in total
 - Air: ~3100
 - Odour: ~1400
 - Dust: ~140

The catalyst for a new approach

Timaru residents still complaining about offensive 'fish' odour

- Many complaints about mystery odour in Timaru
- Plenty of alleged sources
 - Sewer vents?
 - Fish meal processing?
 - Meat processing plants?
 - Other 'random' sources

Mystery Timaru Odour

- Officers struggled to locate the source
- Increasing local pressure for the odour to be tracked down and controlled.
- Approached by Australian firm Pacific Environmental to trial their “Backtrack” software

How does the software work?

- Uses local meteorological data + regional and national weather data
- Can cope with terrain (eg movement in valleys)
- Back calculates the path of air movement to a location.

Where does the data come from?

- Environment Canterbury has meteorological stations across the region
- 10-minute data gets pulled from the stations hourly.
- Wind speed, direction, temp, air pressure, solar radiation

Where are the met stations?



How does the back calculation work?

- User enters the time, date and location of an odour incident
- The software calculates the most likely paths of air prior to its arrival at the target destination
- What does this look like?

Data goes in....

COMPLAINTS

Complaint Details	
ID	204
Reference	PE166552 B
Manager on Duty	nathand
Date and Time Complaint Received	18/05/2016 14:10
Complaint Received By	David Baker
Contact Phone	
Contact Email	
Address	
303 Wakanui Rd, Elgin 7777, New Zealand	
Cause Assessment	
Duration (minutes)	30
Follow Up	
Presumed Origin	Radfield
Process Observations	
Date and Time First Noticed	06/03/2016 19:30
Date and Time Response Sent	18/05/2016 14:10
Latitude	-43.9205645585972
Longitude	171.78333775390604
Save	Copy Cancel

Incident ID#

**Complainant's
location**

Alleged offender

Incident Time

**Environment
Herby**

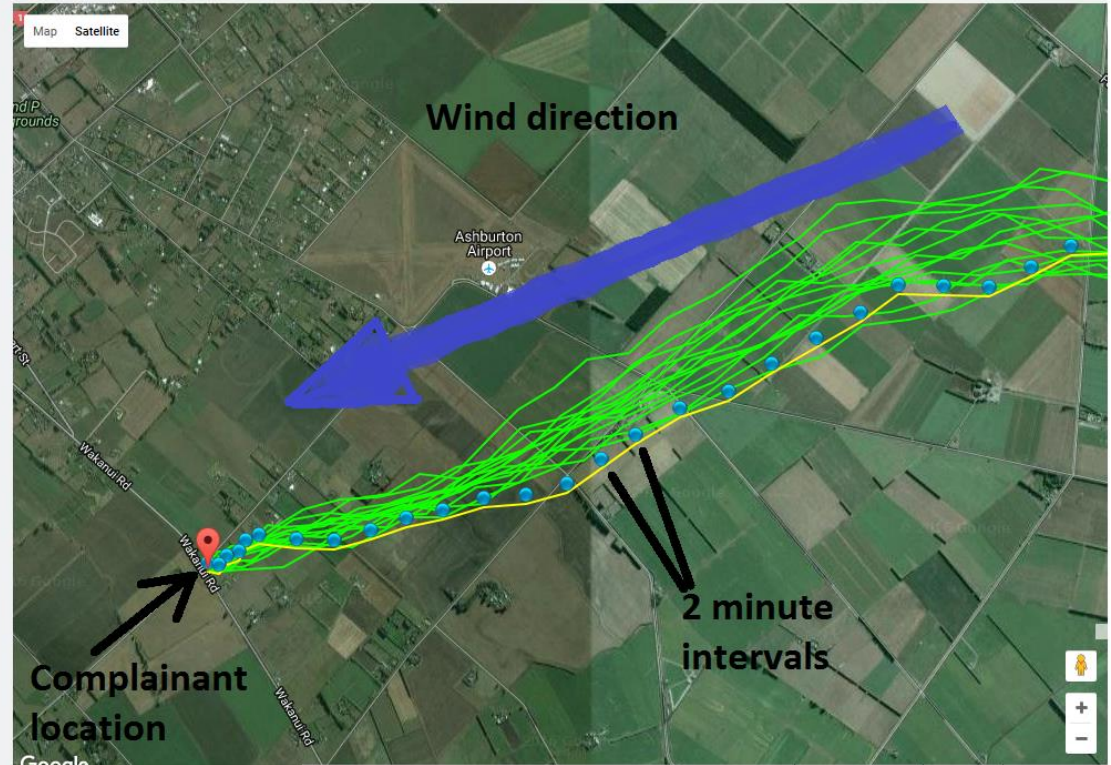
Regional Council
Kaunihera Taiao ki Waitaha

Report comes out...

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Save Copy Cancel



What you find out

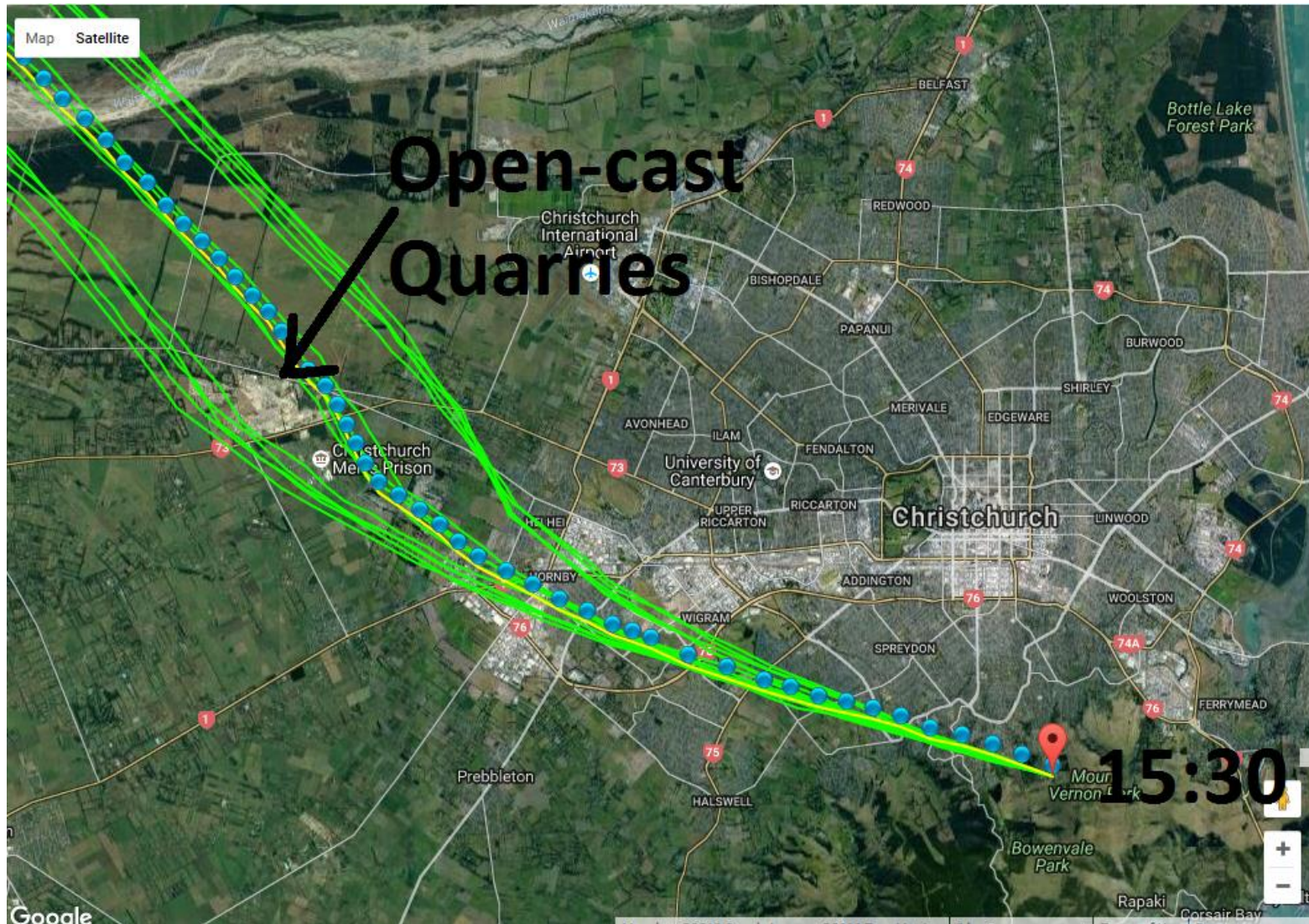
- Using the report a user can determine:
 - whether wind direction supports the complaint
 - if the odour/dust/smoke probably came from somewhere else
 - Compare information from complainant v alleged offender
 - Corroborate investigation information

Timaru mystery odour

- Result?
- Wind movements tracked back to the port area
- 2 fish meal processing factories
- Model was successful



Dust storm, 10 March 2016



Quarries and dust control



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ury

Regional Council
Kaunihera Taiao ki Waitaha

Stubble fires

- Commonly tool in Canterbury cropping
- Remove biomass and pests

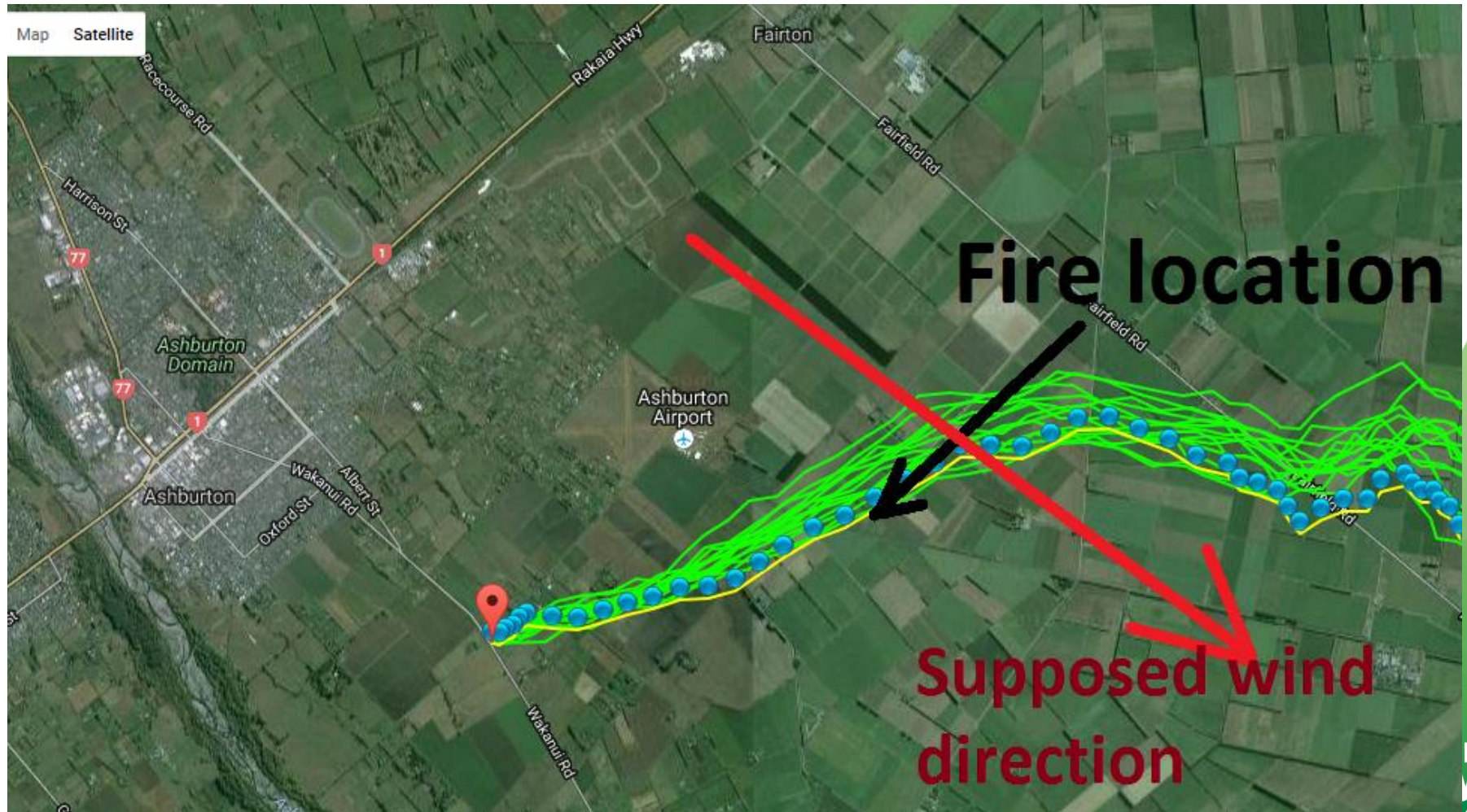
But...

- Can cause offensive smoke & poor air quality downwind
- Traffic hazards

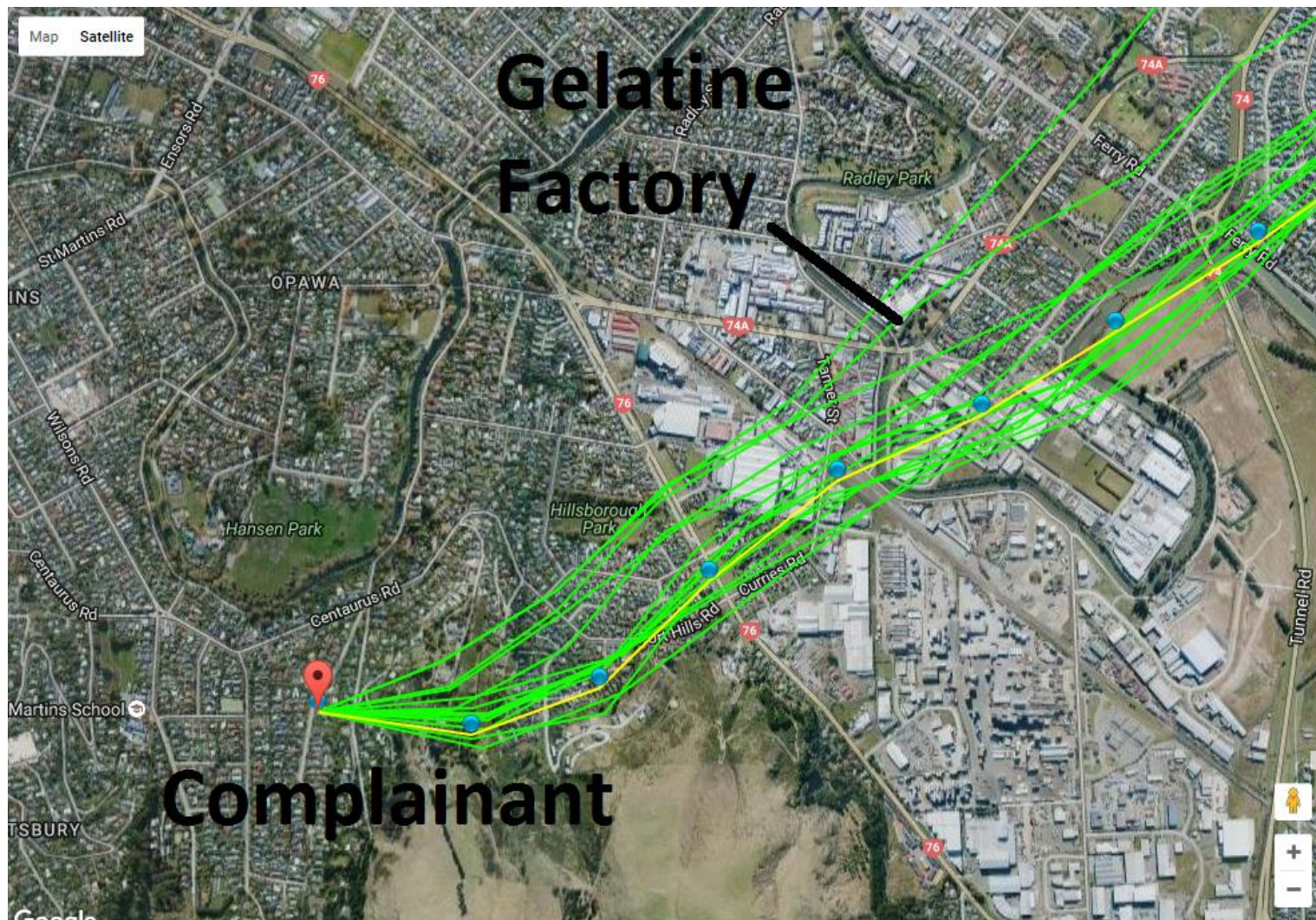
Crop stubble fires



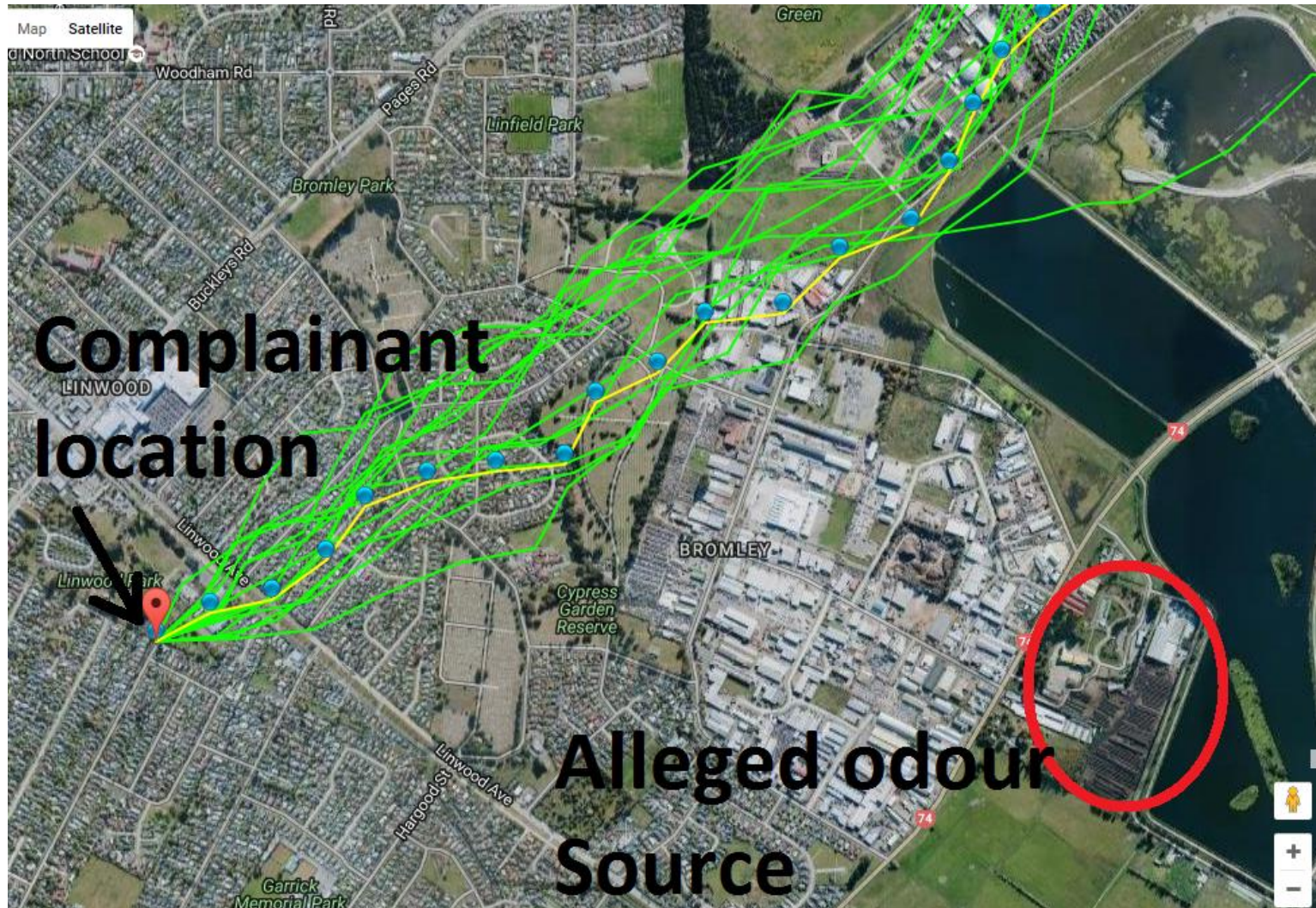
Stubble fire – checking the alleged offender's statement



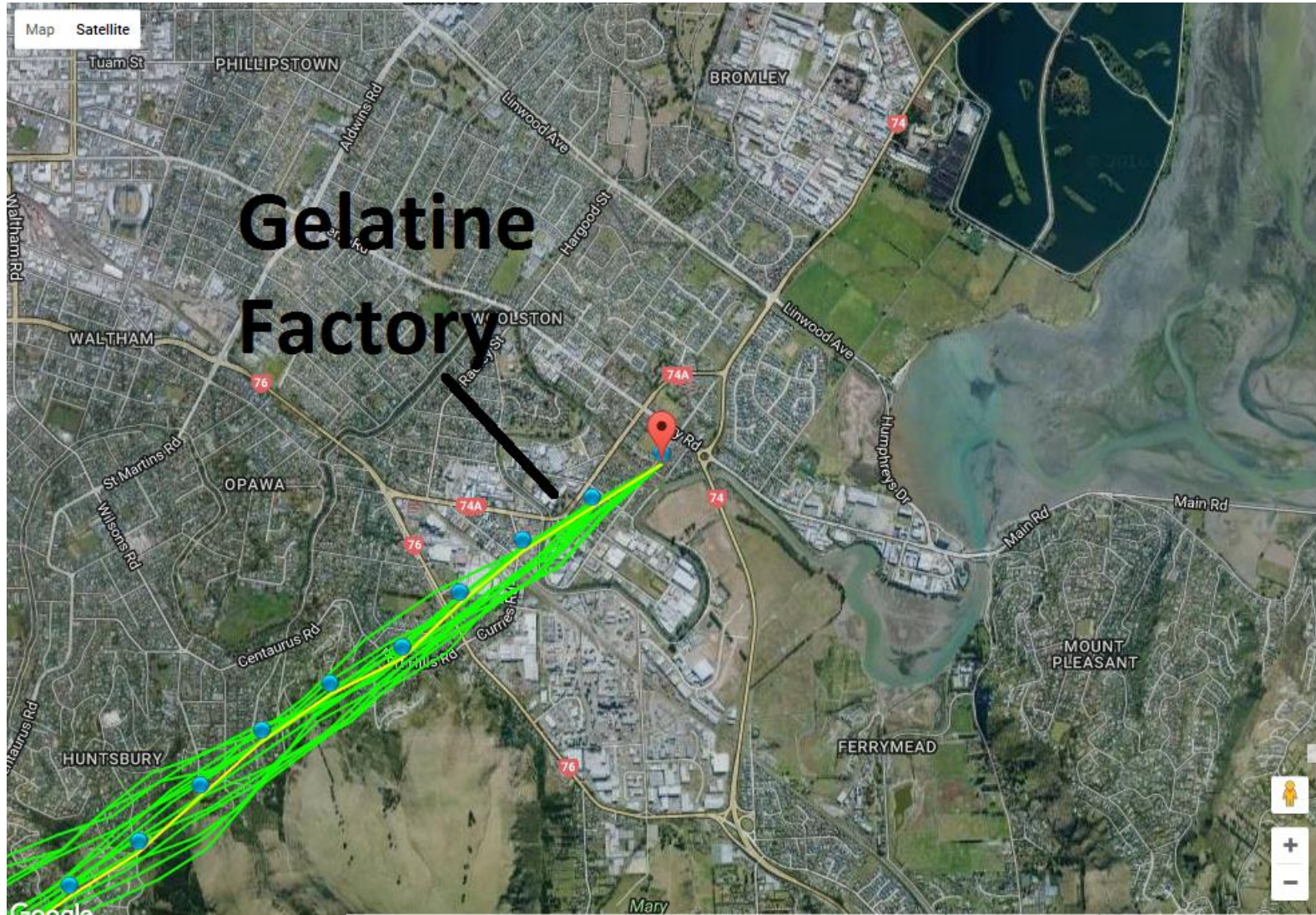
Odour: The complainant could be right...



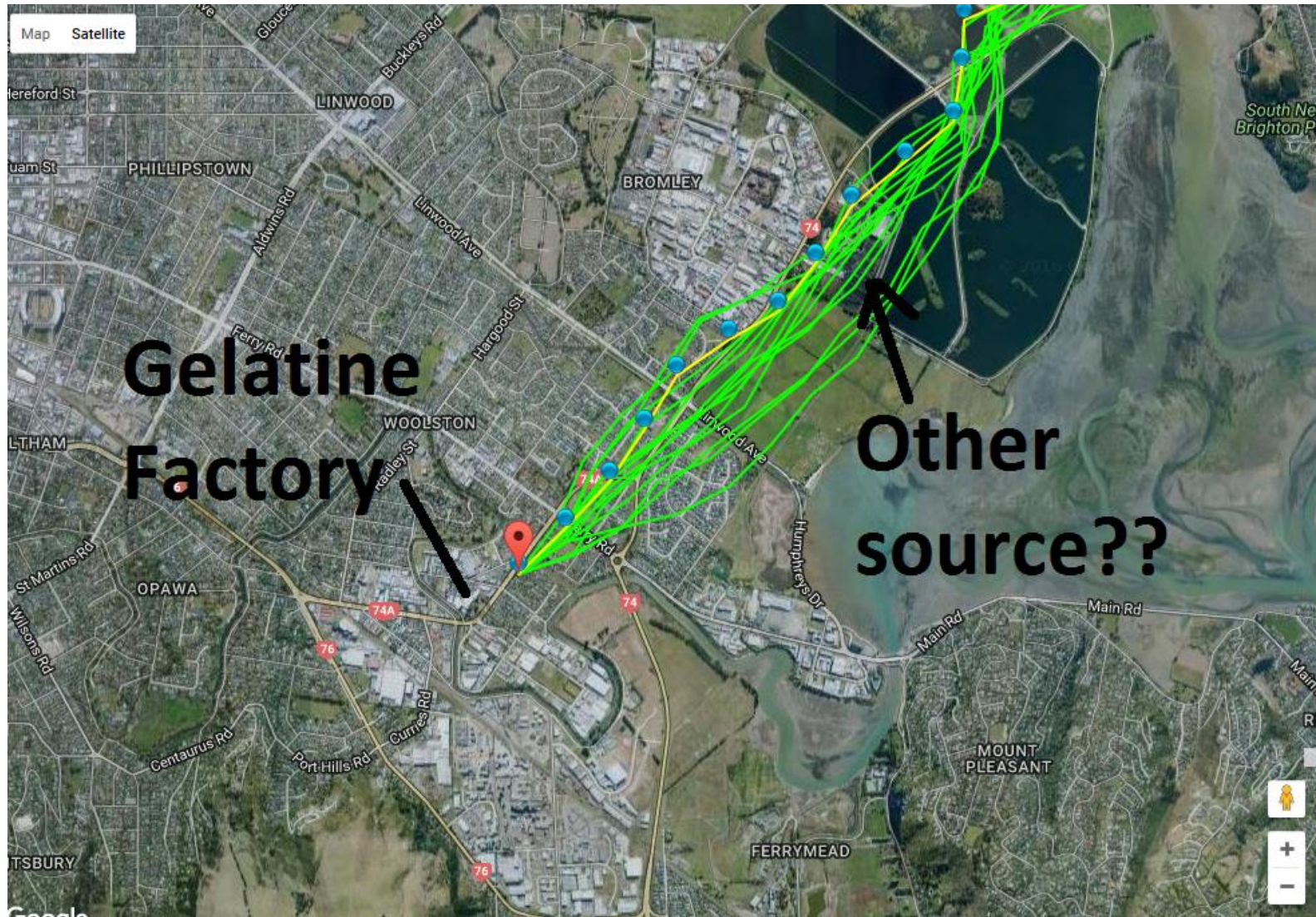
When the data says the complainant's allegation is inaccurate...



Checking odour diarist's information - 1



Checking odour diarists' information - 2



Corroborating an investigation - odour



Corroboration – not quite that simple

- Air paths didn't precisely overlap with the location of an alleged similar odour on the source site
- This apparent uncertainty can be attacked
- Support scientists say that this we can have confidence in this result – they overlap enough

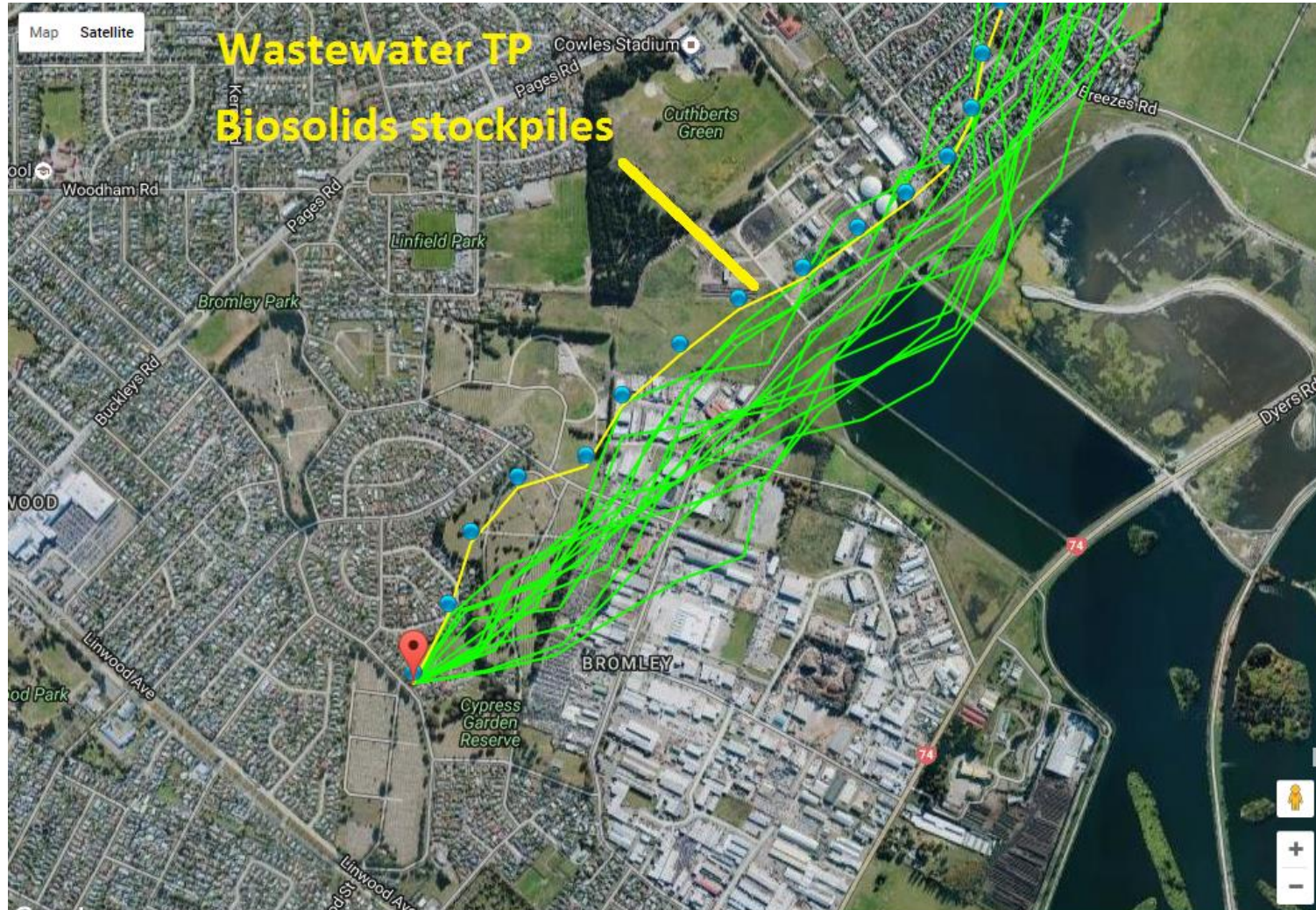
Major mystery odour in eastern Chch

- Bromley school closed because of a gas smell
- Initially, no clear idea of the source
- Multiple backtracks to look at patterns
 - Not absolutely definitive
 - Helpful patterns emerged

Mystery Bromley odour



Mystery Bromley odour – found?



What have we discovered?

- It is a very helpful tool
 - Comparing the allegation with reality
- Expensive - \$30,000 per annum
 - But now that we have used it, would you be effective without it?
- Limited by the data
 - Proximity to Met station
 - Fill in gaps with NIWA data