

Jollies Pass Road

Using Leapfrog™ to visualise temporal changes
to contaminant plume behaviour

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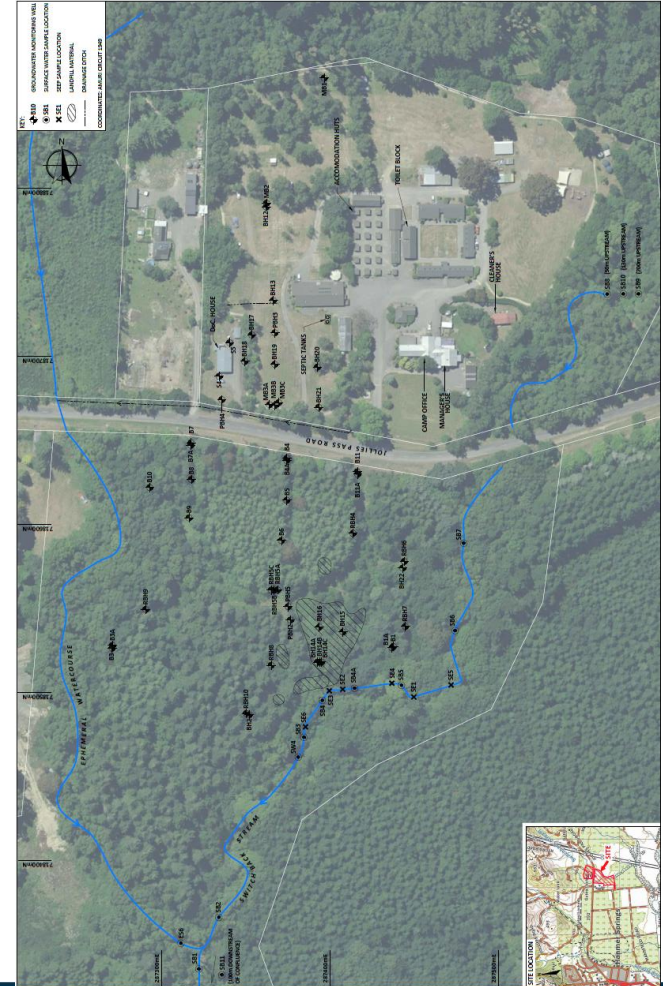
Site history

- New Zealand Forest Service timber treatment facility from the 1940s
- North used for timber treatment
- South used for timber storage
- Primarily used creosote prior to 1954 with ~15% Pentachlorophenol (PCP)
- ~5% PCP in oil carrier use from 1954 until 1973 when site closed
- Landfill infilled a gully in the southern half
- Currently northern part of site is used by Hanmer Springs Forest Camp Trust and southern part is managed woodland and scrub

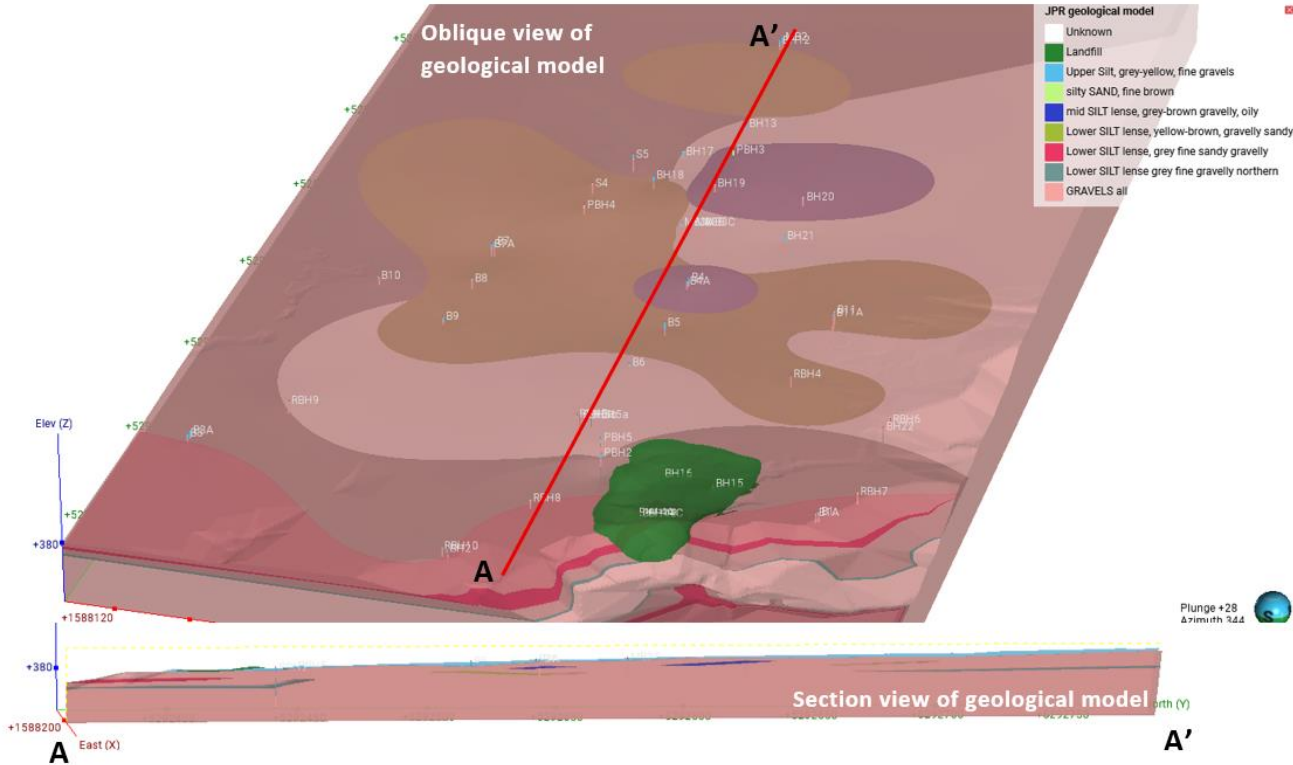


Monitoring and Management

- Contaminants are plumes of PCP and TPH, with free-phase product present in north
- Key risks are to the Switchback Stream and downstream receptors
- Longstanding agreement with ECan requires 6 monthly monitoring includes:
 - Sampling
 - 30+ monitoring wells
 - 6 seeps
 - 12 stream locations
 - Flow gauging
 - Landfill inspection
- Has been ongoing for more than 25 years.
- Significant cost and time
- Now have enough data to assess risks more effectively



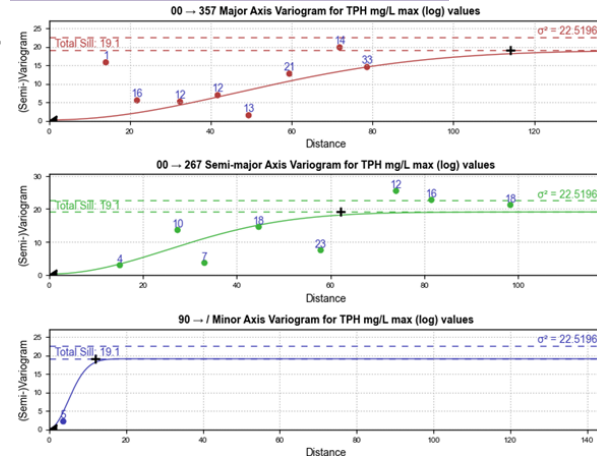
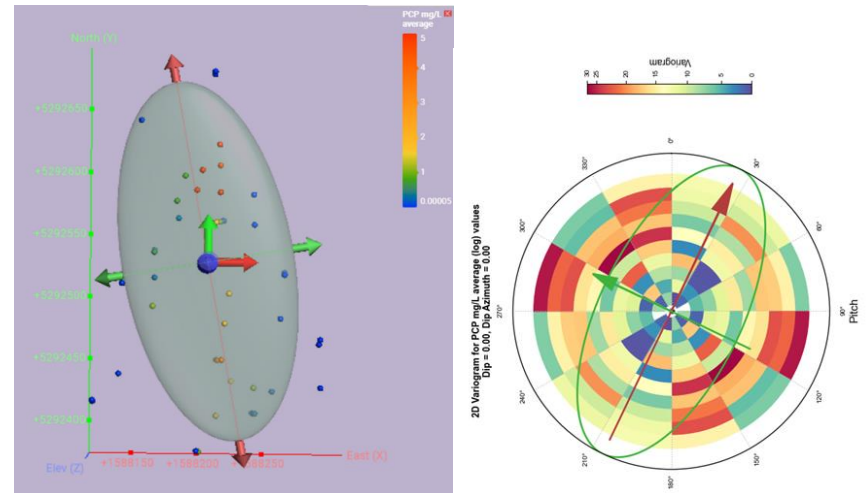
Leapfrog Geological Model



- 48 bore logs
- 3 investigations
- Different levels of detail in logs
- Assumptions made around extent of silt lenses
- Best estimate based on available data

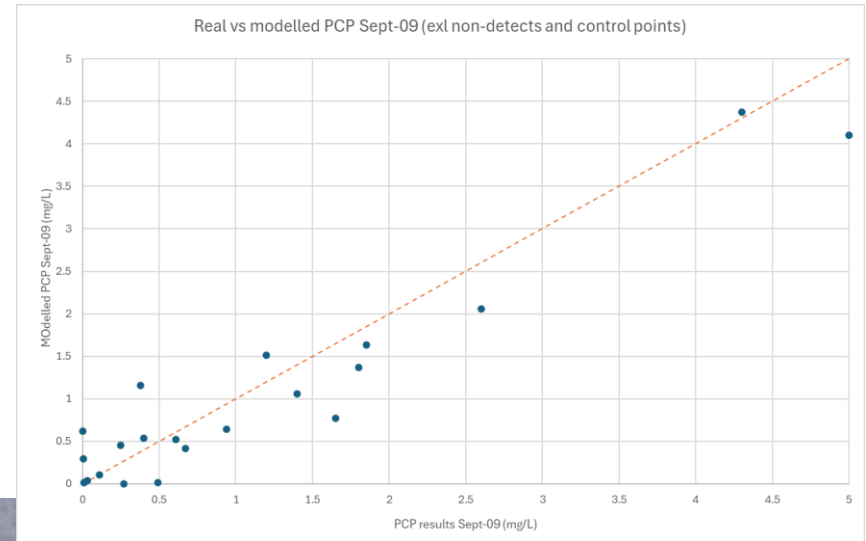
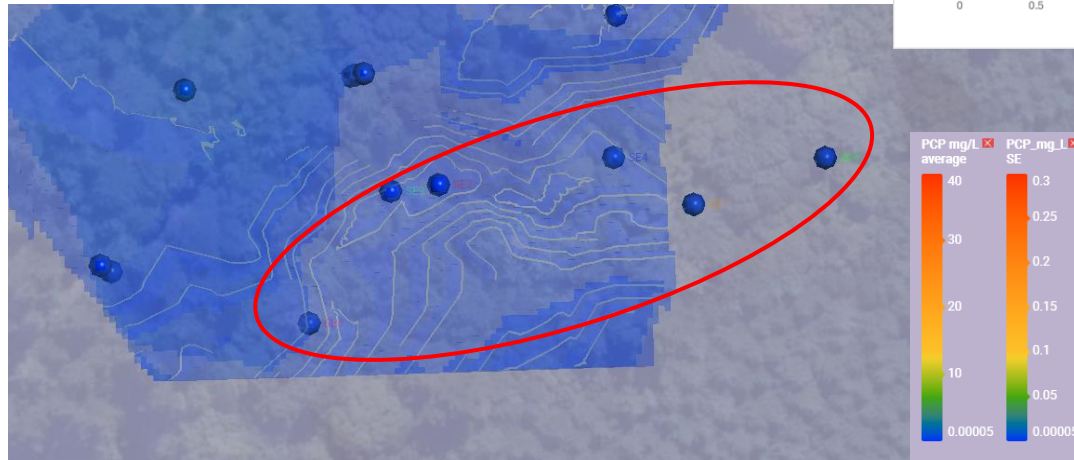
Leapfrog Plume Models

- Uses geology model and existing contaminant data
- Concentrations within a defined domain estimated using geostatistical methods
- Block model so can scale sensibly to model size
- Repeatable for different monitoring events to track changes over time

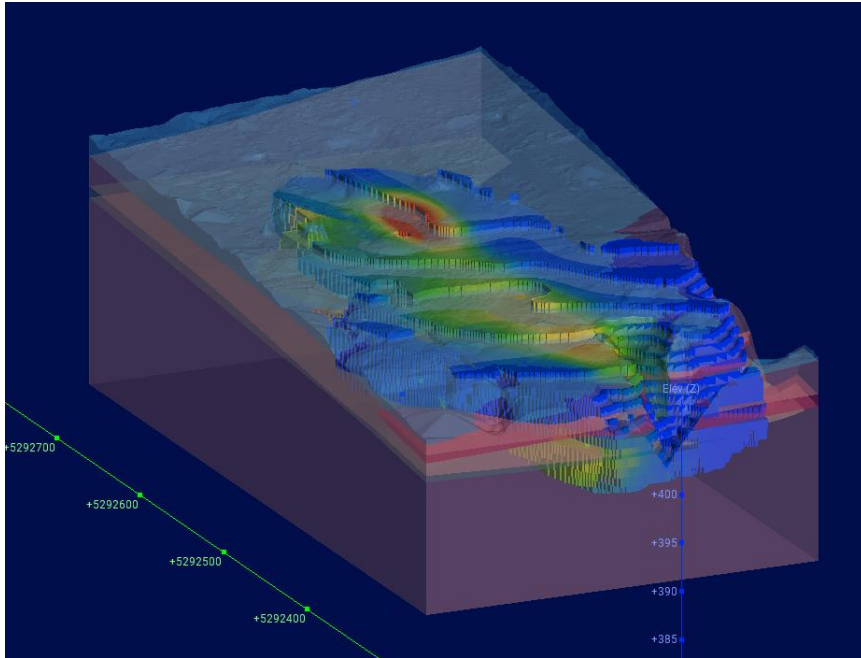


Calibration Checks

- Modelled and measured values for groundwater
- Measured values at seeps (not included in the plume modelling)

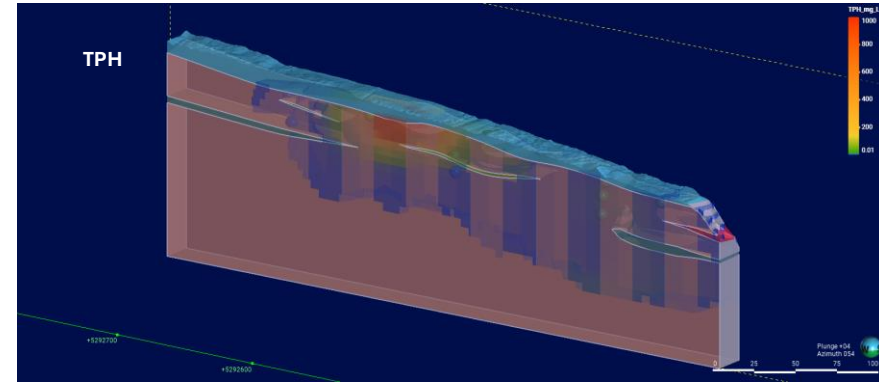
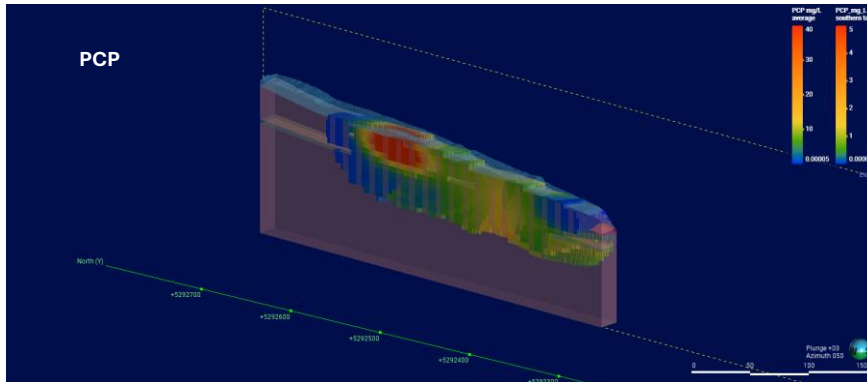
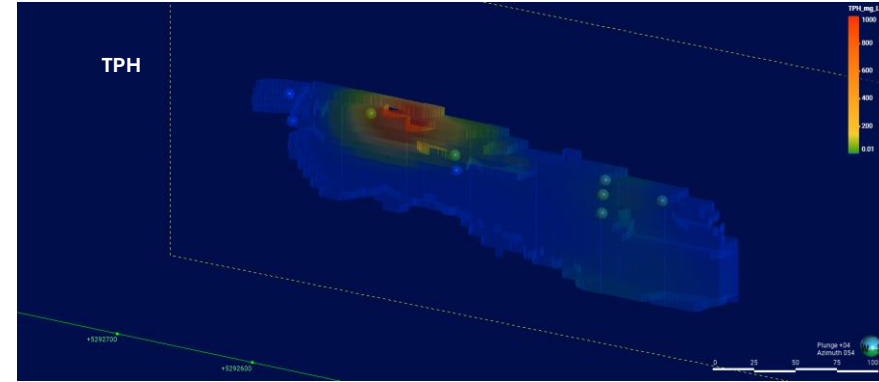
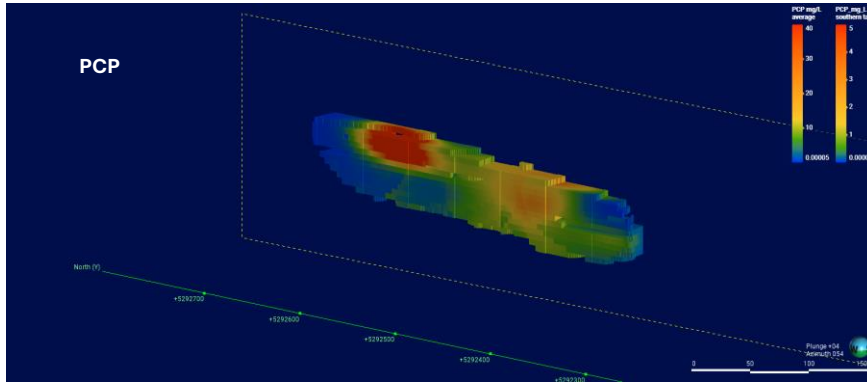


Tool for communication

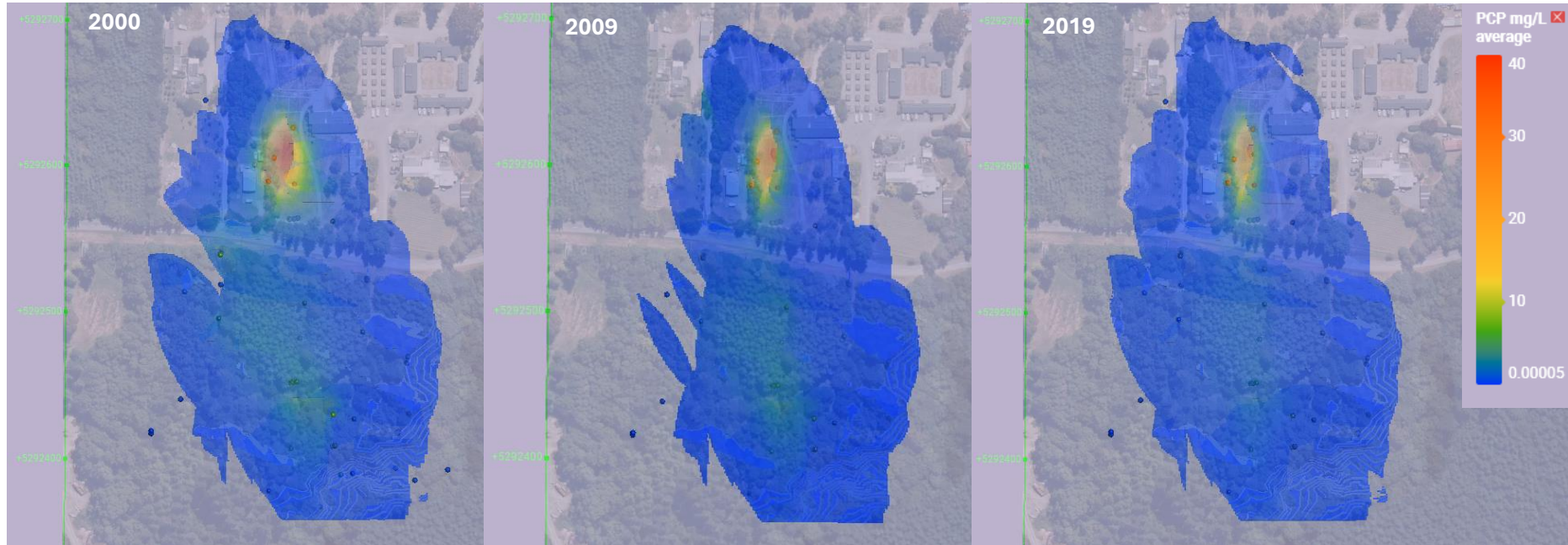


- 3D visualization of plumes
- Real plume extents at set times
- Easy to make sections/plans etc.
- Time series data so can look at changes over time
- Can flick easily between different contaminant plumes and time steps
- Viewer file is free allowing stakeholders to interrogate the model independently

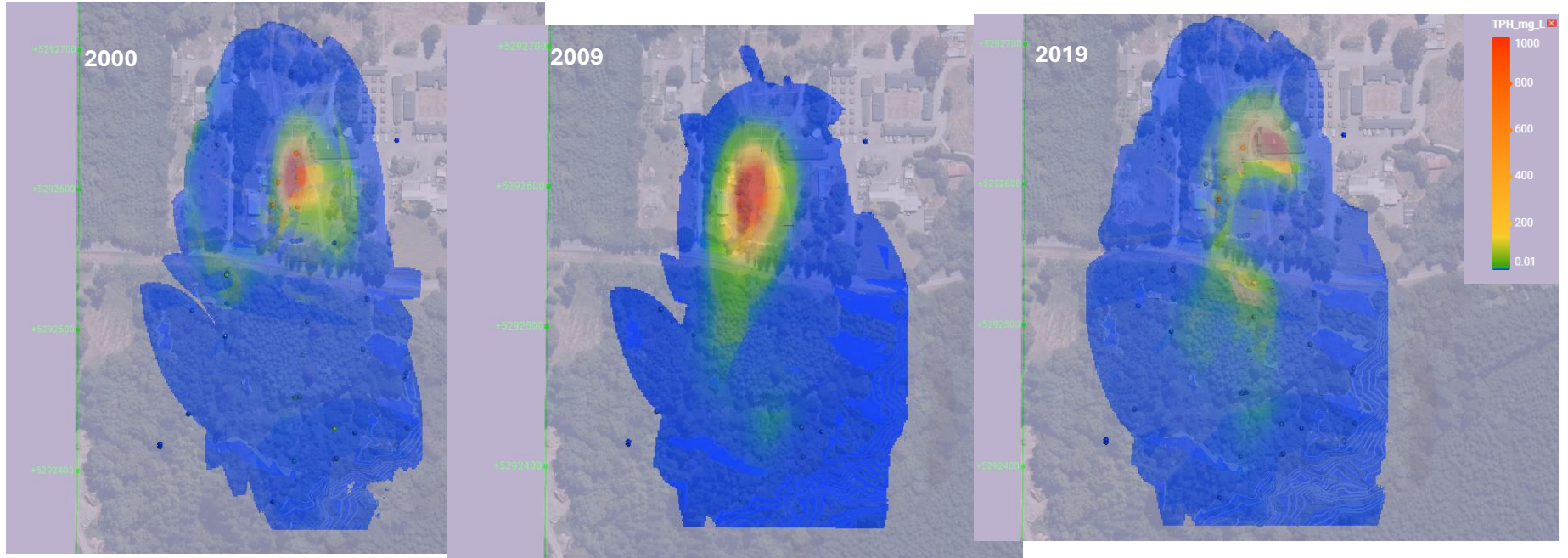
Tool for communication



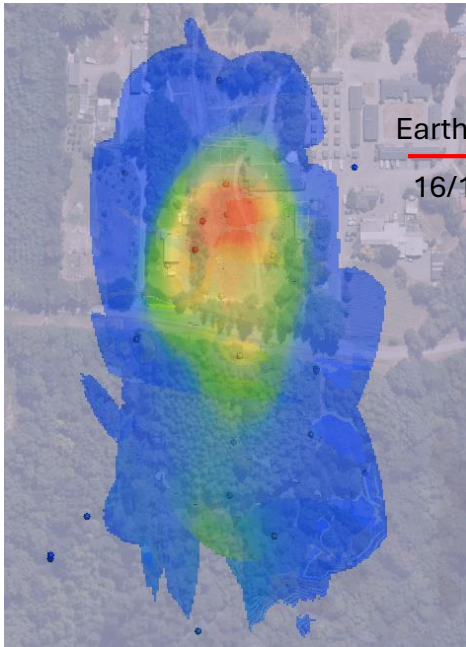
Results - PCP



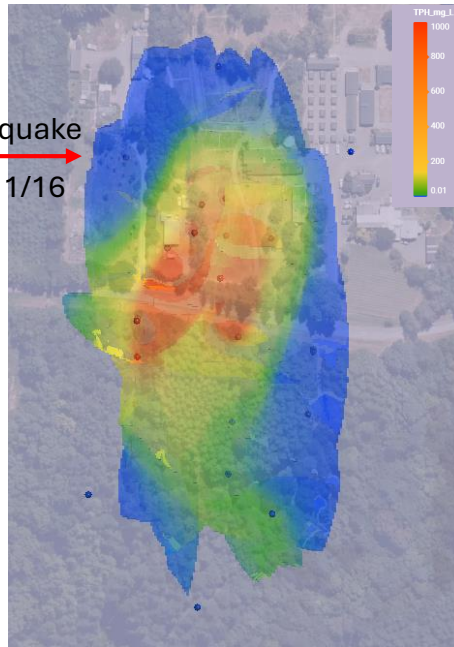
Results - TPH



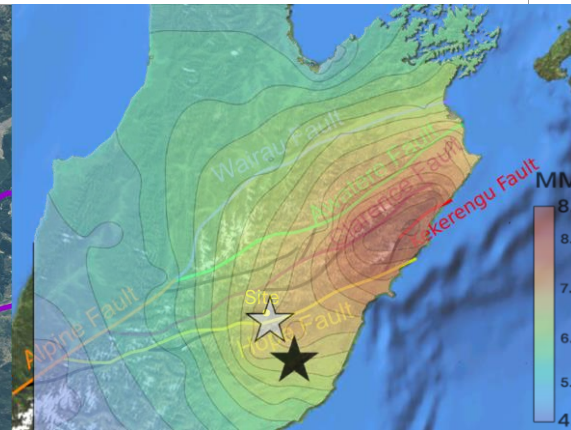
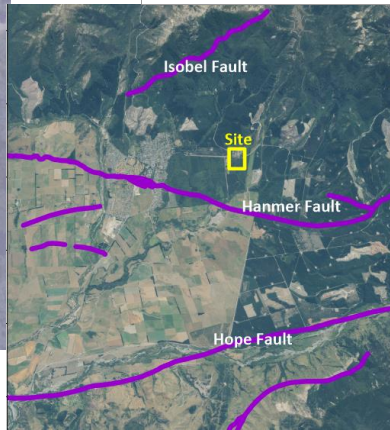
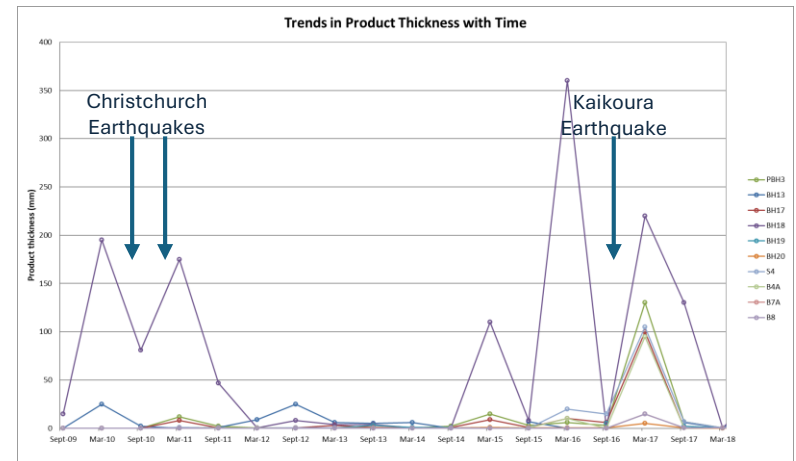
Results – TPH Earthquakes



March 2016



March 2017



Recommended changes to management of site

- Reduced targeted monitoring on an annual basis to protect the stream
- Measurement of product in all bores each monitoring round
- Inclusion of 10 yearly full monitoring round to check for long term changes
- Reduction in stream and seep sampling to key locations
- Requirements for full monitoring following significant earthquakes (with constraints on size and location)
- RISK BASED APPROACH



Thanks and special mention

Now



1999ish



2009



2019

Graeme Proffitt – working with LINZ on JPR for over 25 years

