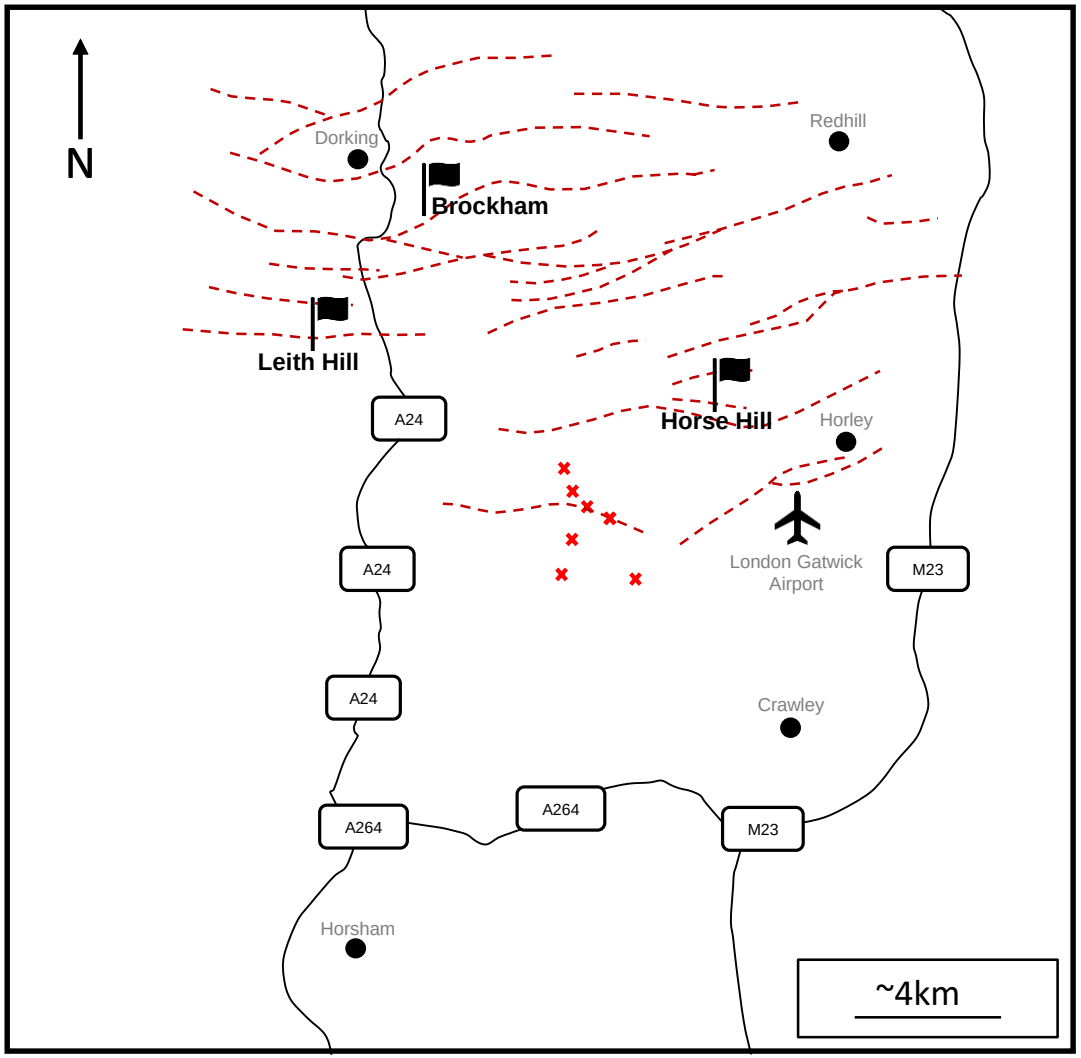
OGA – Surrey Earthquakes

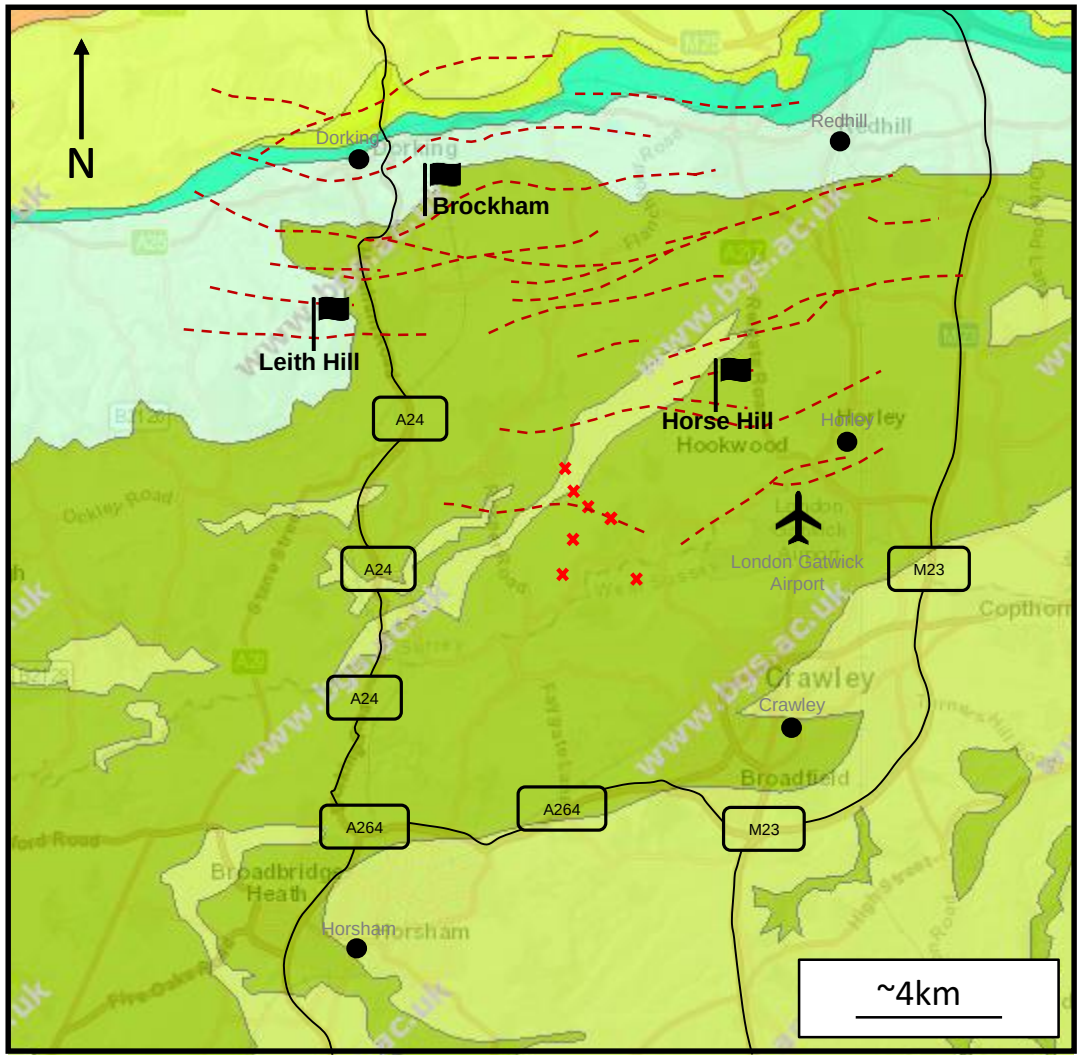
October 2018

ANGUS ENERGY

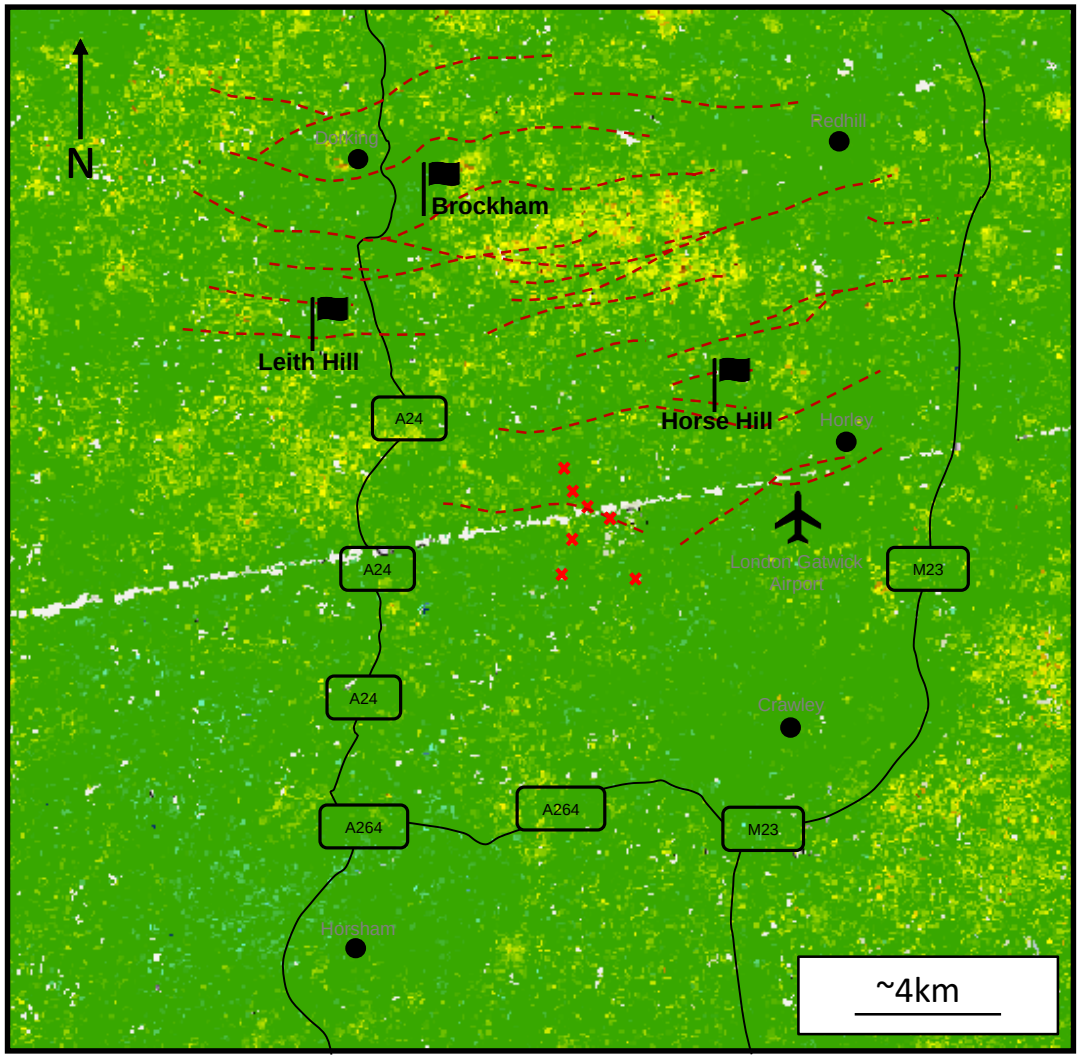
Site Location Map & Faults



Location Map w/ Underlying Geology



Location Map w/ Surface Deformation

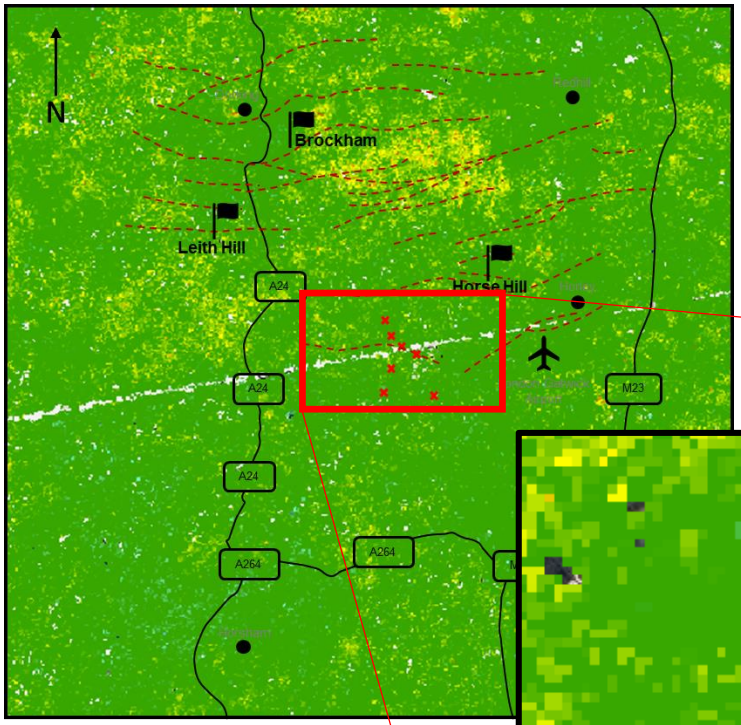


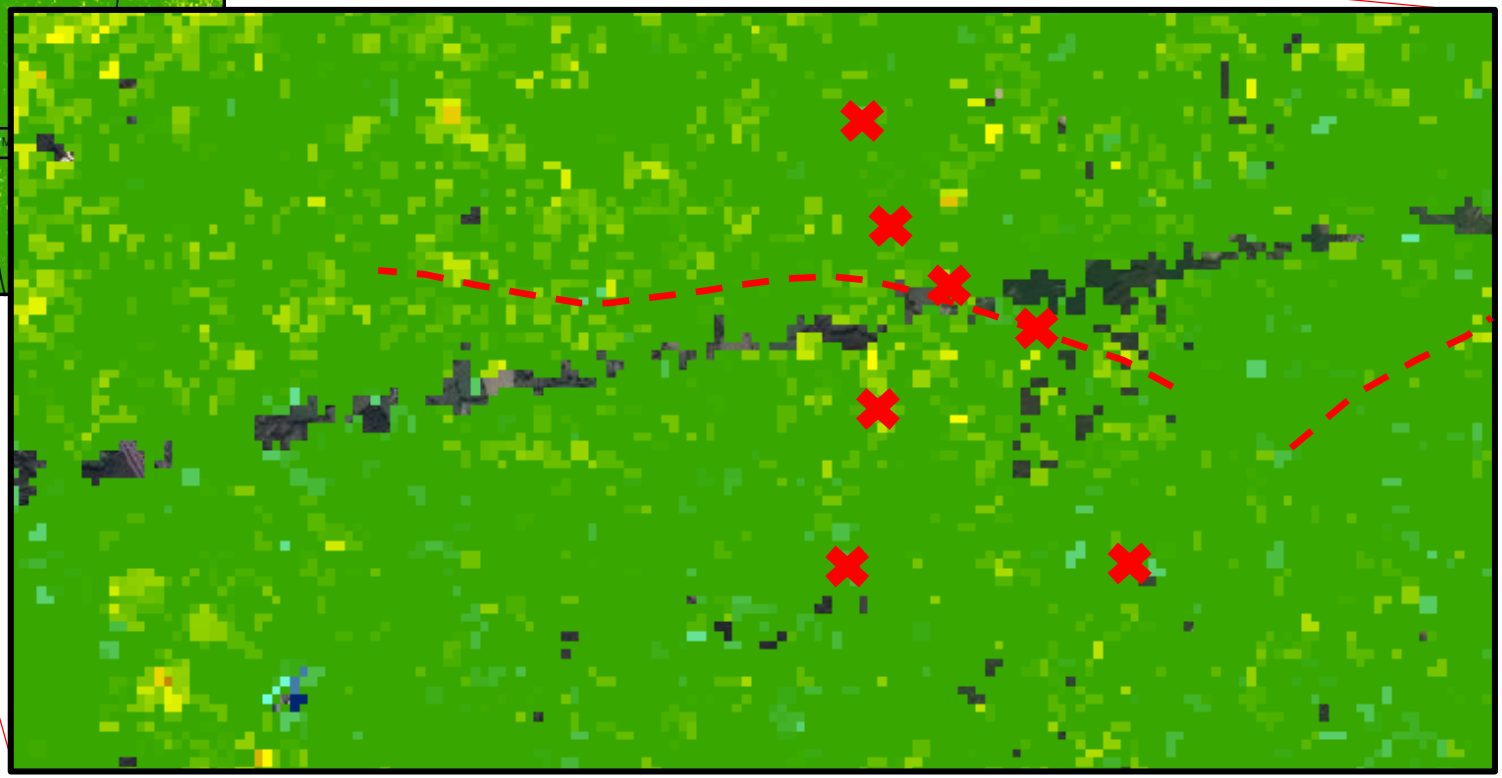
Subsidence -8mm/yr

Uplift 8mm/yr

https://mangomap.com/geomatic-ventures-limited/maps/72883/united-kingdom-relative-deformation-map?preview=true#

Surface Deformation (Zoomed)

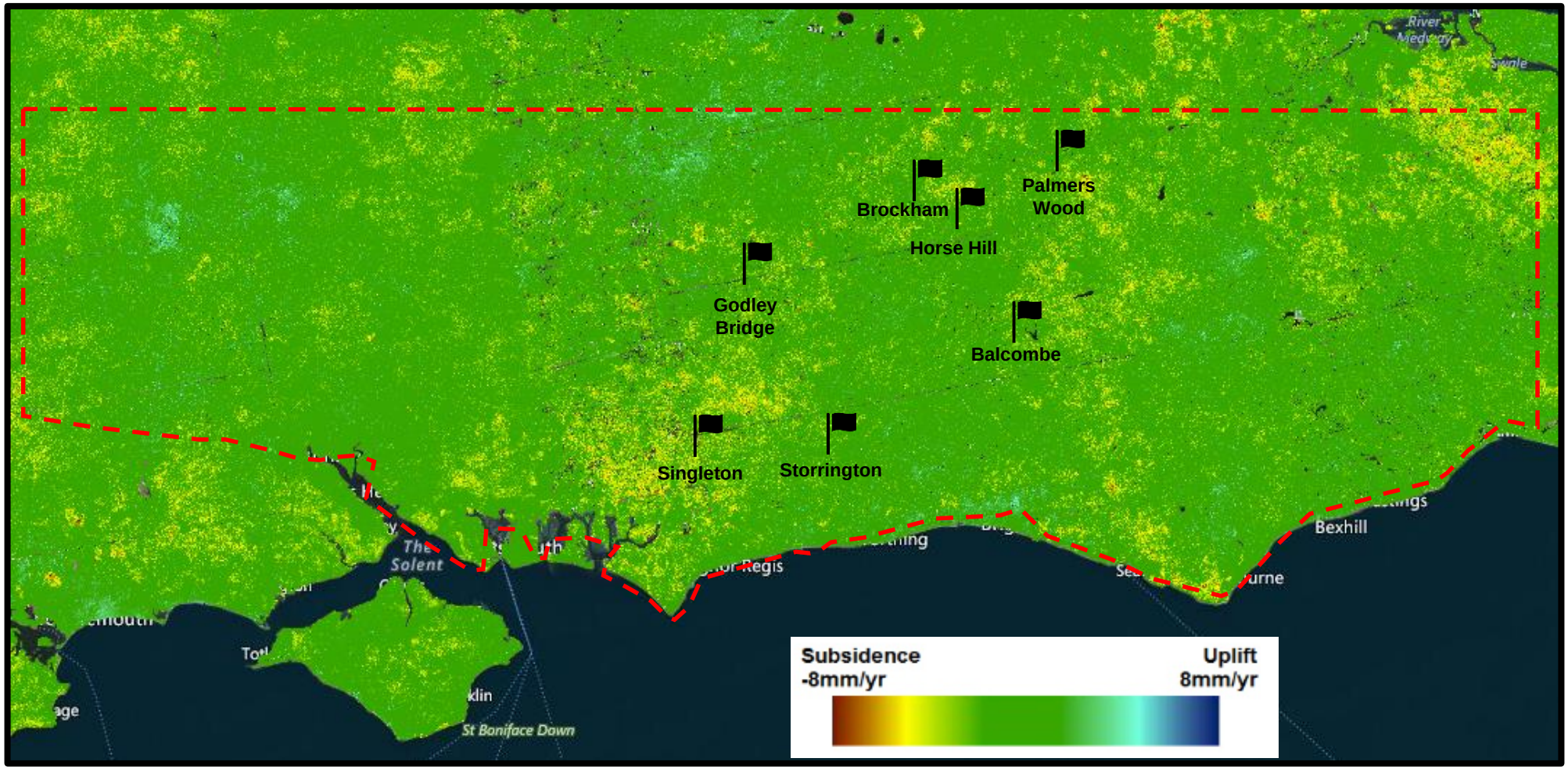




Subsidence -8mm/yr

Uplift 8mm/yr

Surface Deformation - Weald Basin



Water Extraction

"SES Water supplies 160 million litres of clean water each day to 688,000 people in east Surrey and parts of West Sussex, west Kent and South London"

→ 160 Million Litres = **1.006 MMbbls per day**

→ Brockham in total has produced approximately **490,000 bbls of fluid** over its lifetime

Brockham Mass Balance

- OGA records show that the Brockham field has produced approximately 490,000 bbls of fluid
- Approximately 62,000 bbls of formation water has been re-injected into the reservoir
- 428,000 bbls of fluid have therefore been removed from the reservoir
- 12% of the total fluids pumped out have been re injected
- (N.B. figures exclude effects of compressibility, FVF etc

- Initial Portland Sandstone reservoir pressure ~900 psi, reservoir pressure now approx. ~500 - 550psi (drop of ~400psi)
- As above, 428,000 bbls removed from reservoir giving a drop of ~400psi
- Fluid level (oil) approx. 1400ft above reservoir. Assuming 0.35 psi/ft gradient = 490 psi

- Illustrates significant depletion