

Hatfield *quarries, quarries and the plume*

Land for the early Hatfield Aerodrome was brought by De Havilland in the 1930s.

WW2, the Mosquito fighter bomber was made here in its factories.



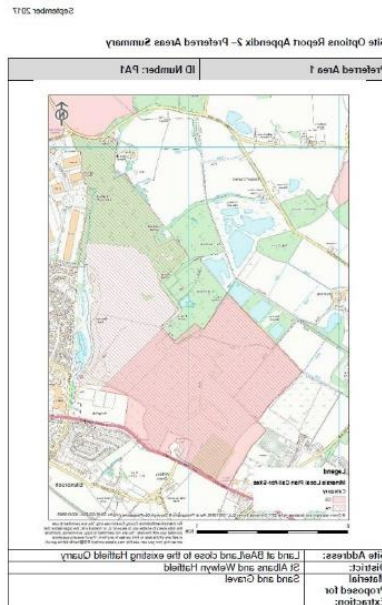
Later the airfield became part of Hawker Sidley and then passed to BAe, who ceased aircraft production in 1993.

The airfield closed, but for a brief period became a film set for Saving Private Ryan and TV series Band of Brothers.

The developers brought the 400-acre site, and part of it became the Hatfield Business Development. Hertfordshire University was built here.

A green belt, called Ellenbrook Fields was proposed as a gap between Hatfield and St Albans.

A mineral plan was also part of the old airfield to the west of the site.



An early preferred area taking the whole of Ellenbrook fields
The new site now moved away from bromate plume

The site was part of an allocated Preferred Area in the 2007 Minerals Local Plan.

The bromate plume and effects of quarrying

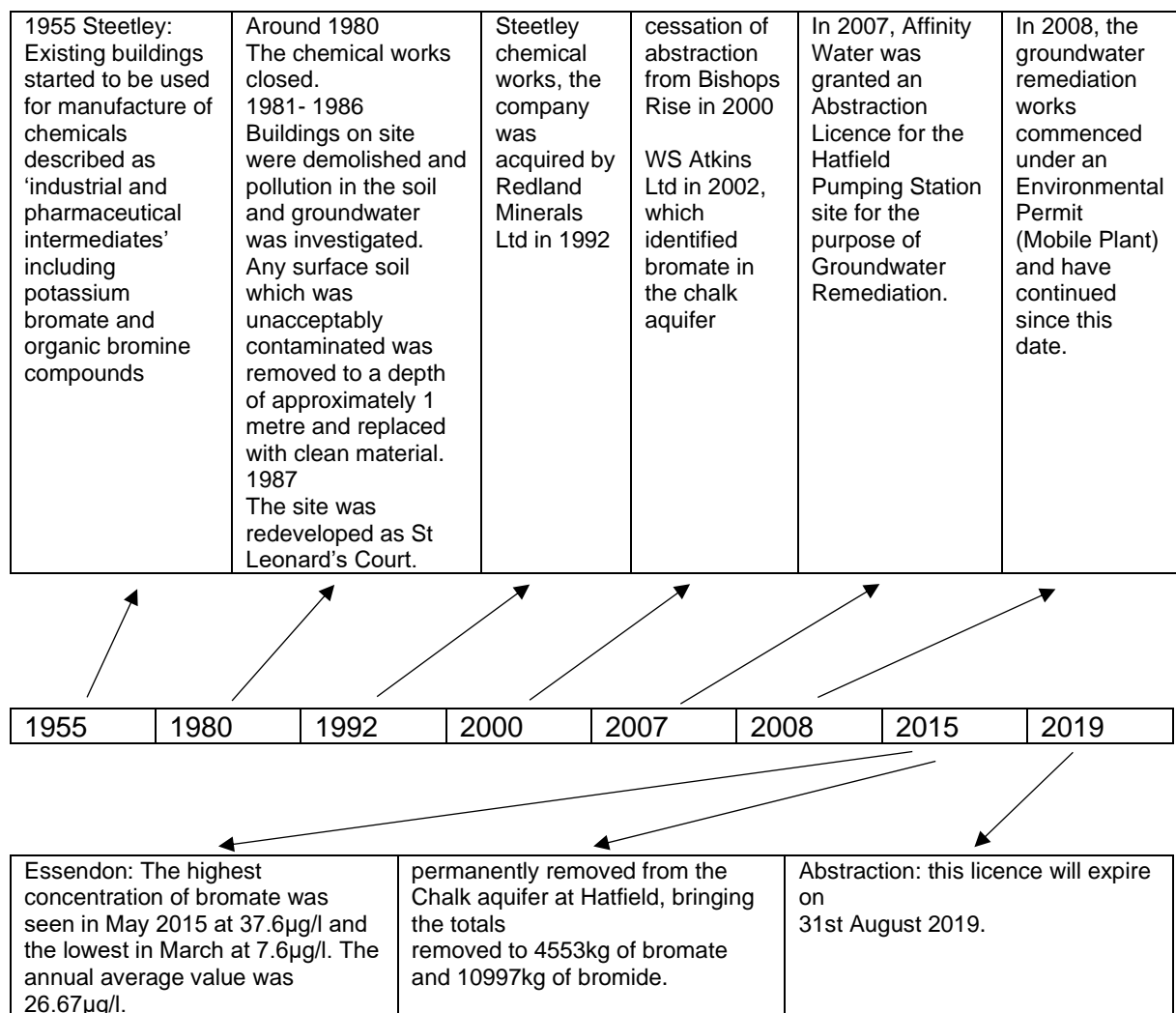
The Aquifer - a body of permeable rock which can contain or transmit groundwater

When water-bearing rock readily transmits water to wells and springs, it's called an aquifer. Aquifers are underground reservoirs – this is where 97% of the planet's liquid fresh water is stored. Almost no bacteria live in aquifers.

Steetley chemical works Sandridge 1955 – 2000

The Steetly Chemical Works was a chemical manufacturing plant which specialised in the manufacture of industrial and pharmaceutical intermediates including potassium bromate and organobromine compounds. Raw materials including bromine, red and yellow phosphorus, and caustic soda were processed into products including ceta-stearyl bromide, sodium and potassium bromate, and zinc bromide.

Bromate & Bromide salts were used in the factory. These toxic chemicals were dumped into large sumps that eventually drained into the aquifer; so causing Europe's largest underground pollution.



2000 Three Valleys Water detect bromate concentrations of 100µ/l, well in excess of the future drinking water standard of 10µg/l, at Hatfield PWS. The EA are informed and abstractions for public supply are ceased. A sampling programme is undertaken that identifies St Leonard's Court as the source of the contamination.

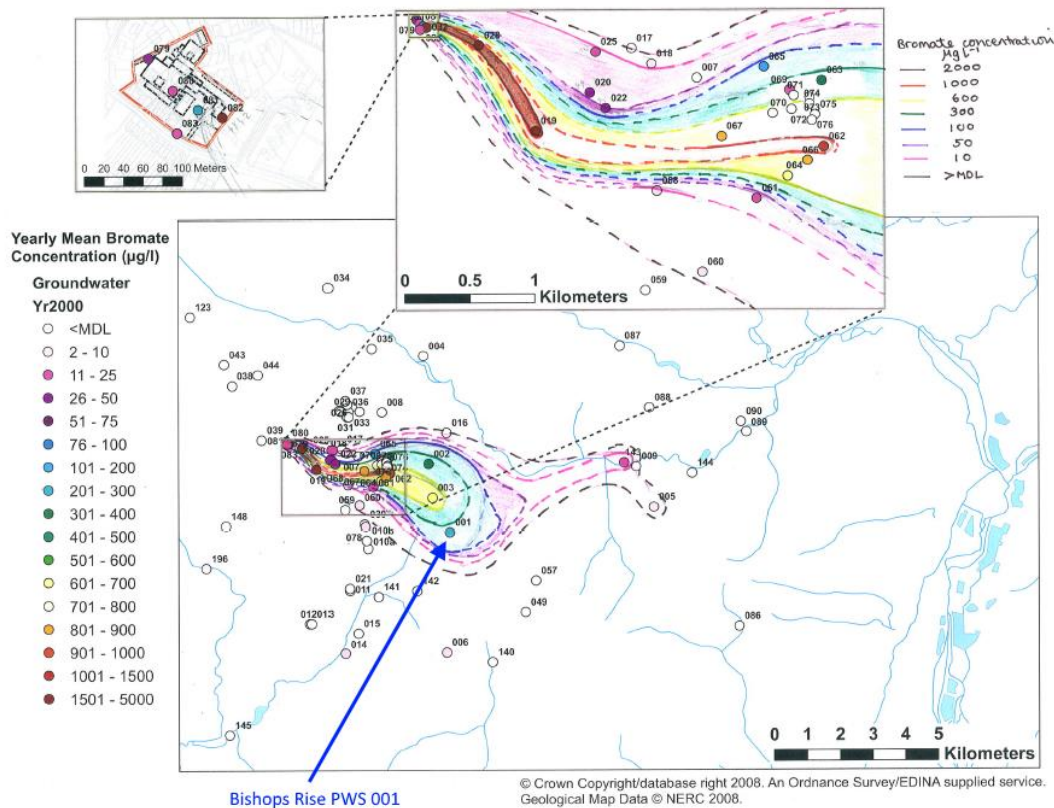


Figure 4.11: Annual average bromate concentrations at groundwater sampling locations in 2000.

Ciara Marie Fitzpatrick

Fig4.11, shows the plume reaching Bishops Rise PWS in year 2000. It is not clear the exact amount of bromate but the shaded blue area may indicate 201µg/l to 300µg/l. The exact amount before 2000 is not known – testing frequency of this pollution is indeterminate. The only conclusion due to such high values is that this pollution may have occurred 20 years prior to Bishop Rise closing.

Case study - An investigation into cancer incidence in areas exposed to high levels of bromate in East and West Herts. P87.

Dr Paul Aylin investigated cancer incidence in exposed areas of East & West Hertfordshire and found that the region did not appear to have a higher risk of developing cancers.

Aylin, P., Savigny, P. and Hodgson, S. (2003), United Kingdom - Case study - An investigation into cancer incidence in areas exposed to high levels of bromate in east and west Herts, in 'EUROHEIS, A European Health and Environment Information System for Exposure and Disease Mapping and Risk Assessment, Final Report 2003', EUROHEIS, page 87.

Dr Paul Aylin, Pauline Savigny, Susan Hodgson (SAHSU)

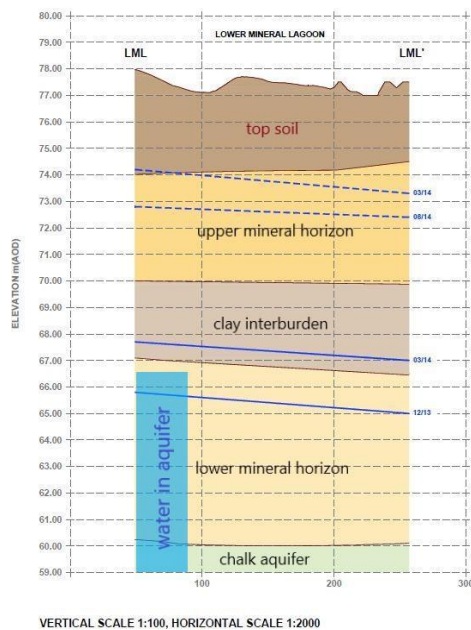
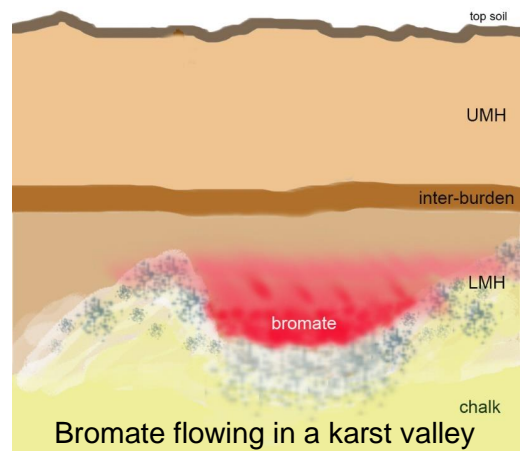
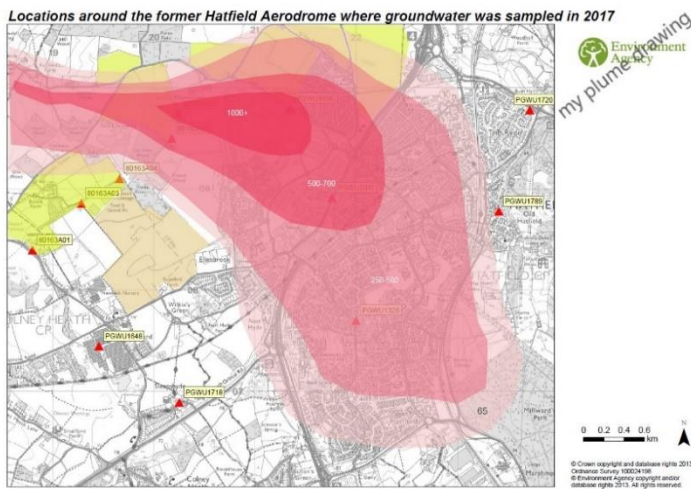
[download EUROHEIS](#)

Pollution across Hertfordshire

At Bishops Rise PWS in 2002 a chemical called bromate was detected. This at the time became significant as the WHO set a maximum level of bromate of 10 µg/l in drinking water. It is a carcinogenic agent.

The source of the contamination was traced to Steetly, chemical plant in Sandridge Hertfordshire. The plant had closed in 1980 but in the intervening years had dumped large quantities of bromate into the groundwater and aquifer.

The bromate & bromide contamination spread like a plume towards Hatfield, closing Bishops Rise water supply. The plume direction passed close by to the proposed quarry site in an area of strata called the lower mineral horizon (LMH) and the chalk aquifer.



Dr Bryan Lovell, OBE, CGeol.

“The problem with the chalk aquifer is this: very quick pollution, very slow decontamination”

“Monitoring of pollution as it takes place is not the main issue: pollution must be prevented from the word go”.

Drinking Water

Affinity Water have shown their concern in mineral plans submission:

Please see below for comments from Affinity Water regarding specific sites referred to within the Hertfordshire Minerals Local Plan (as detailed within Appendix 3 of the draft plan):

Hatfield Aerodrome:

This site falls within a Source Protection Zone 2, corresponding to our Roestock source. This is a public water supply, operated by Affinity Water. Any mineral extraction work at this location should ensure that there is no excavation below the boulder clay, in order to retain the protection to the Chalk aquifer. The plan references proposed workings into the “lower mineral horizon”; if this means the gravels overlying the Chalk and underlying the boulder clay, then this would constitute a very high risk activity in regards to groundwater. Bromate is also mentioned as a risk that needs to be managed so that groundwater quality is not affected during or post mineral extraction. Affinity Water would request to be consulted and updated with regards to all groundwater monitoring and progress in respect of this site, including any progress meetings, in order to ensure public water supply is not affected.

Removed objection...20th May 2019 with a private legal agreement.

Public water supplies Roestock & Tyttenhanger (Colony Heath) are 1.6 miles to the south from known bromate pollution





Environmental Agency response 7th December 2017:

In response to the concerns you raise in your email below, I have the following information:

Please find attached a map of the bromate and bromide monitoring locations around the proposed Hatfield aerodrome and a spreadsheet of the data from these locations covering 2017. Monitoring is quarterly and undertaken by environmental consultants on behalf of the companies responsible for that groundwater pollution.

In 2012, the Environment Agency raised the issue of the existing groundwater pollution during pre-application discussions with Brett Aggregates: our concerns were the need to properly establish the boundary of the bromate and bromide pollution both in area and depth, and to ensure any proposed activity would not cause that boundary to migrate or cause the pollution to spread into other parts of the Chalk aquifer or into other aquifers or surface waters. If those unique site-specific issues were resolved, then the EA permit application and HCC planning applications could be considered in the normal way.

Since 2012, Brett's environmental consultants have built a much more detailed picture of the geology and hydrogeology beneath the site, based on their own monitoring combined with the bromate and bromide monitoring results from EA and information from Affinity Water. After discussions with Affinity, Brett's and their consultants, we are satisfied that the boundary of the bromate and bromide pollution is well defined and contained within the lower gravels and chalk aquifer, which are naturally connected. Brett's proposal consequently evolved so that:

- they will only extract aggregate from areas of the site unaffected by the bromate and bromide pollution,
- they will monitor the groundwater pollution throughout the life of the proposal,
- they will limit dewatering of the lower gravel excavations, and
- the lagoons will be constructed so that they are sealed from the other aquifer, i.e. any water will be returned to the aquifer from which it came.

The monitoring of the wider bromate and bromide groundwater pollution by environmental consultants on behalf of the companies responsible for it, will continue for the foreseeable future.

In response to the other concerns raised in your word document, I have the following explanations:

The pollutants themselves aren't slow moving; Bromide is an ion with similar characteristics to chloride and will travel at broadly the same speed as groundwater flows, whereas bromate is a larger molecule so will not travel as fast as the groundwater in which it is dissolved but it is not so large that it is significantly retarded. The groundwater plume of pollution appears constant because the source of contamination is steadily releasing contaminants into the groundwater.

The shape of the plume of this Chalk groundwater pollution has varied little since the pollution was discovered. Groundwater plumes of pollution will tend to be narrow and elongated along the direction of groundwater flow, especially in aquifers like the Chalk where groundwater flow is constrained within fissures. Consequently, a steep gradient in concentrations across the groundwater flow direction is typical – as you have noticed and will see in the attached data. The plume has probably been distorted southwards by pumping in Hatfield, historically for public water supply and more recently to reduce the flow of pollution to downstream chalk groundwater abstractions for public water supply.

The water in the lower mineral lagoon will be from the lower gravel aquifer and will recharge back into that aquifer, the lagoon will be sealed from the upper gravel aquifer. Therefore the overall quality of water within the 2 aquifers should not change down-hydraulic gradient of the workings.

It is unlikely that bromate will spontaneously form in the lagoon because the heat energy, chlorine and ozone concentrations required for the reaction will not be present. For more information on this, you may find this document useful - www.who.int/water_sanitation_health/dwg/chemicals/bromate260505.pdf "Bromate in Drinking-water: Background document for development of WHO Guidelines for Drinking-water Quality" World Health Organization, 2005, WHO/SDE/WSH/05.08/78. This document states, "Although bromate can be formed on simultaneous exposure to chlorine dioxide and light, the reaction is thermodynamically unfavourable, and bromate is unlikely to be formed under water treatment conditions." When reading this, it is important to remember that it focuses on treated water for supply and also that it was published after the groundwater pollution was identified and after the Hatfield public water supply abstraction taken out of service.

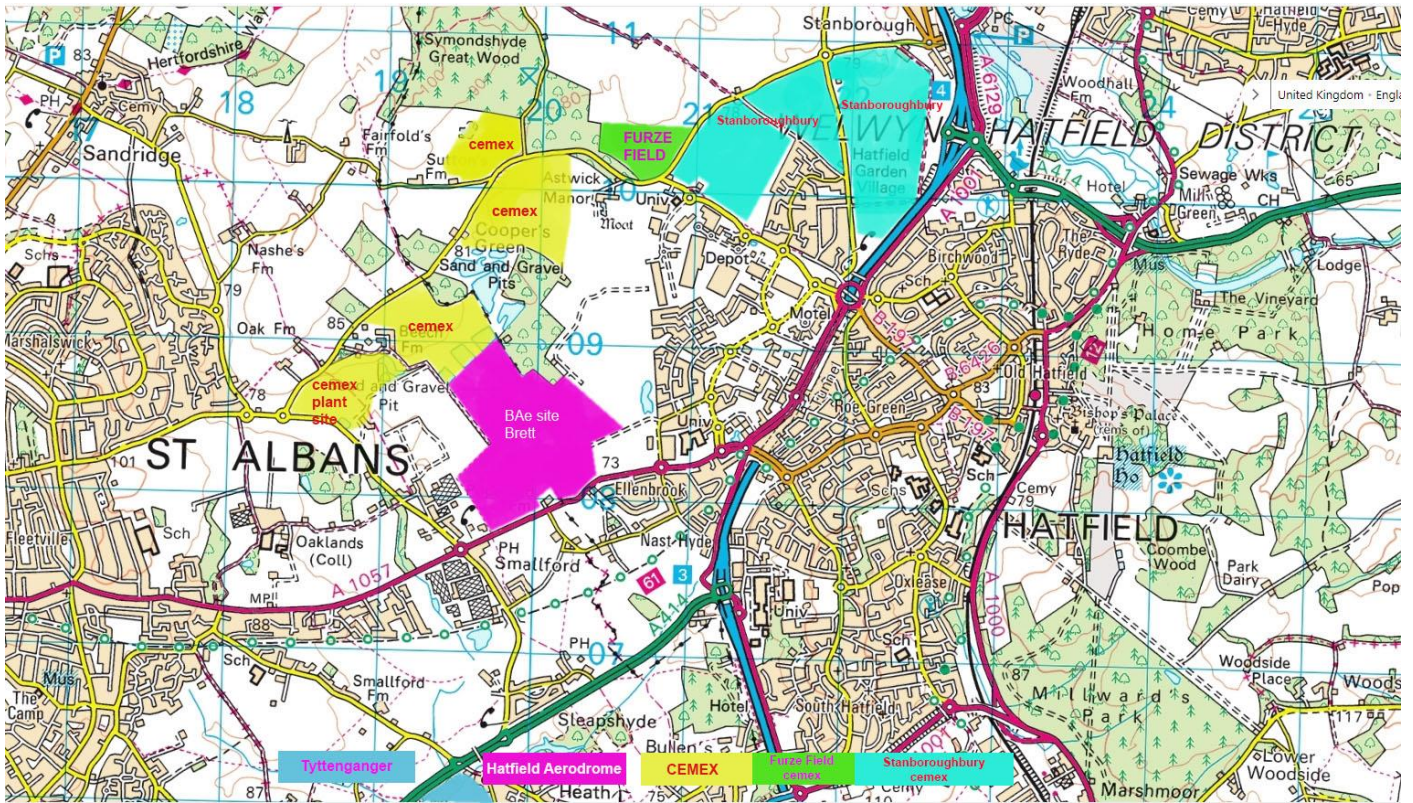
EA 22nd February 2018:

- If the plume travels South as far as Water End, will it join up with N.E transport to the Lee Valley? See red arrows on Concept of the plume.
 - The plume already intercepts the preferential pathways to the Lea valley because low concentrations of bromate and bromide are detected along the River Lea. The sampling suggests it intercepts the fissures somewhere east of Hatfield, but we can't confirm the exact place it intercepts the fissures feeding the springs and groundwater PWS along the Lea valley.

 - If a new application for quarrying on the BAe site were to happen, would it restrict workings to only the top UMH and not touch the LMH & Chalk Aquifer?
 - I believe this question should be directed to Herts County Council who are responsible for the planning decision. EA provides them with advice. We would advise against disturbance of the lower aquifer if we believed there was a risk of spreading contamination or other risks to groundwater quality. ***

 - Are there two directions of water flow in the chalk aquifer. S.E on the lower aquifer and N.E on the upper surface water?
 - The direction of groundwater flow is north-eastwards within the upper mineral horizon, comprising predominantly sand and gravel, which is strongly influenced by local rivers.
 - Regional chalk groundwater flow direction is eastwards to south-eastwards and is locally influenced by the size and orientation of cracks or fissures in the rock. These may vary with depth and location but we can only know with certainty the fissuring in proximity to a borehole. Crucially, the tracer tests previously undertaken by the Metropolitan water board and UCL can only show the input and output locations, not the route taken by the groundwater.
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Cumulative effect of multiple quarries



Brett Aggregates *_proposed*

company	site	transport	yield	completion
Brett aggregates	old BAe airfield	dumper trucks	8M tonnes S&G	32 years

* February 2016, Brett Aggregates applied for a quarry, and the application (5/0394-16) was heard on the 25th January 2017 subject to 5 provisions, one of these provisions included a deed of variation between the land owners (Arlington) and all the various Councils.

* A public exhibition held on Friday 28th October 2015

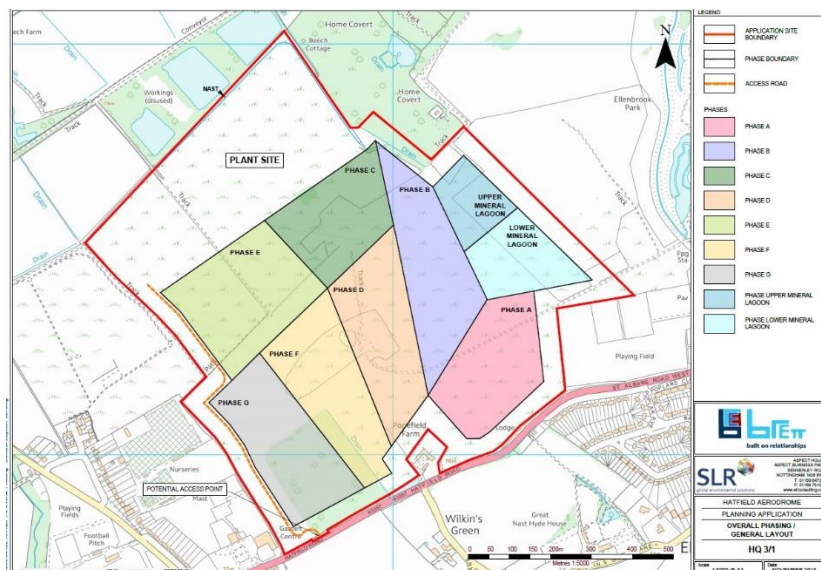
Planning permission was granted in December 2000 for a mixed use development. The Section 106 agreement forming part of the planning permission provided for the creation of a country park on the land to the west of Ellenbrook. The agreement was guided by the Hatfield Aerodrome Supplementary Planning Guidance document adopted by Welwyn Hatfield Borough Council in November 1999.

The establishment of the country park has not been carried out but remains a requirement of the original Section 106 agreement and is still enforceable.

Consultation Draft Mineral Plan 2017 Spatial Planning and Economy Unit

“The deed of variation had not been completed within 1 year and the matter must be referred to the committee (DCC) for a decision on how to proceed. Therefore, planning permission has not been granted”

David Williams CC



This was rejected by Hertfordshire County Council Development Control Committee (DCC) on the 24th September 2020 by 5 votes to 4.

Tyttenhanger Quarry

company	site	transport	yield	completion
tarmac	coursers road	dumper/belt	7.1M tonnes	2031



Hatfield Quarry LACGL extension

company	site	transport	yield	Completion
Cemex UK Ltd	Oaklands Lane	conveyor belt	3.5 M tonnes	2034

This is an extension to existing quarry.

Specific site Hatfield quarry, Symondshyde & Furze Field already worked – F.F 0.45 M tonnes, October 2016.

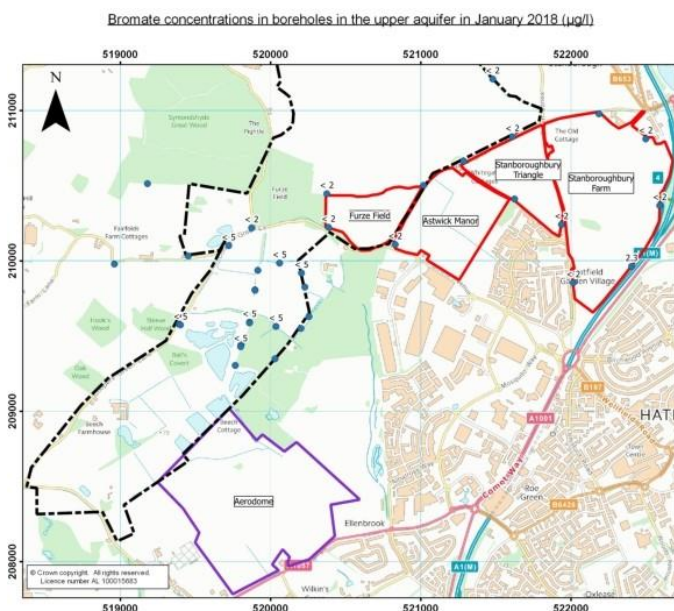
250 HGVs to and from Oaklands Lane St Albans. 200 HGVs inert material via Coopers Green Lane – 7am start, 3.1 M tonnes of inert material.

Time scale. Each of 10 phases takes 1 year to complete plus restoration 2 years. Phases 1-3 West side Stanborough, phases 4-6 triangle, phases 7-10 Astwick Manor in the East.

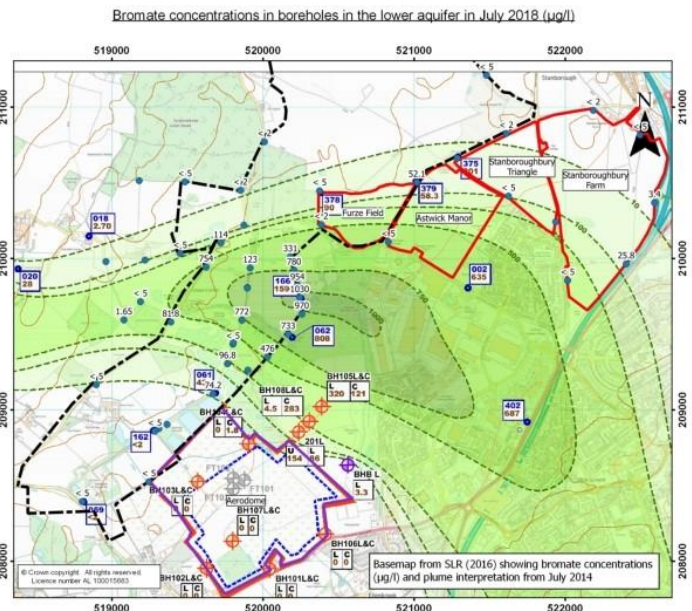
Landbank at present 7.2 years, adds 2.5 years to total.

80m gap between quarry & residential areas.

Conveyer belt passes under roads, re-routed from Symondshyde site – only 1 way.



Location of quarry in red outline.



Bromate plume(green) from SLR

Technical details

Much of the deposit will be worked above water table, apart from the Astwick area which will dewater the Upper Aquifer only. All of the objection points relate to the potential impact of the development on the bromate plume which is present within the Lower Aquifer (comprising the Lower Gravel and the Chalk which are in hydraulic conductivity).

The main recurring themes raised by the EA in their response are broadly summarised as follows:

- Demonstrate that no working within the bromate plume will occur;
- Demonstrate that there is no pathway from the Lower Aquifer to the Upper Aquifer, particularly given that there are a number of elevated bromate results in the Upper Aquifer groundwater (which Stantec and CEMEX believe to be spurious results);
- Demonstrate that there will be no significant change to the recharge regime in order to ensure that the groundwater flow regime, and therefore the bromate plume, is not affected. In particular, the EA have concerns about the proposed discharge of dewatering water into the Lower Aquifer at Cut Field Lake,

as well as the potential effect of increased recharge at the SUDS infiltration basin in the south of the Astwick area.

It is concluded that at the Stanboroughbury area:

- Although the excavation may extend marginally below the water table in the Upper Aquifer, no dewatering will be required and hence no upward gradient from the Lower Aquifer will be induced;
- There will be no working within the bromate plume;
- There is no pathway for bromate contamination within the Lower Aquifer beneath the Stanboroughbury area to reach the Upper Aquifer given the downward hydraulic gradient and consistent presence of the Lower Clay.

conclusion

The greener method of working uses a conveyer belt, and extraction using a surface digger. The conveyer belt system travels for miles, and therefore does not open-up the area to dumper trucks and open cast quarrying.

As soon as one area is extracted then reclamation begins. The new field is filled with original material, and soil, levelled by computer to exact height - the lower mineral horizon is not touched.



360-degree surface digger



Symondshyde reclaimed land in background

- EA Environment Agency
- UMH upper mineral horizon
- LMH lower mineral horizon
- UMA upper mineral aquifer
- LMA lower mineral aquifer
- UML upper mineral lagoon
- LML lower mineral lagoon

10µg/l maximum amount of bromate in micrograms in 1 litre of water set by WHO