

## **To The House Of Lords Session 2015-16**

### **PETITION against the High Speed Rail (London - West Midlands) Bill**

#### **THE PETITION OF: SAVE ST.GILES GROUP**

Declares that:

1. Your petitioner is directly and adversely affected by the whole Bill.
2. Your petitioner:

The petitioner is Save St.Giles. An action group set up to help protect the character of the historic village of Chalfont St Giles.

3. Your Petitioners Concerns are as follows:

The village and community of Chalfont St Giles have serious concern that HS2 ltd are tunnelling in the wrong place at a depth that is too shallow to protect the Chalk stream river, aquifer, village and community as detailed below.

In May 2011 HS2 ltd assured the community of Chalfont St Giles (during their road show) that the twin bore tunnels would by pass the centre of the village and be buried at a depth of 100 m. Months later, these promises were broken. Without informing the community, HS2 was diverted to run directly through the heart of the village at a minimum depth of only 19 m or shallower passing within meters of a Grade 1 listed church, running directly under a rare natural chalk stream, at perhaps the most sensitive location of the river possible.

Save St.Giles have consulted with experts who have local knowledge, not only of the complex chalk beds under the River Misbourne but of the geological make up of the ground on which our village sits. The qualifications and experience of these consultants is impressive (see below). They have serious and well founded concerns that HS2 are proposing to bore through ground at a depth that will result in problems ranging from the chalk stream permanently drying up, pollution of the Aquifer that supplies drinking water to London and the risk risk of ground collapse/ flooding. This new evidence is detailed below,

## **Executive Summary HS2 Tunnel through Chalfont St Giles**

The HS2 tunnel current route, as proposed, transects the Misbourne Valley at Chalfont St Giles. The twin bore tunnel will pass from the northern side of Misbourne under the valley to the southern side of the valley. The valley is underlain by Chalk, in particular the Seaford Chalk. At the shallowest point the twin tunnels will be only 19m or shallower (estimated) below the surface or two tunnel diameters beneath the surface (HS2 engineer, Commons Select committee hearing, July 14<sup>th</sup> 2015). The subsurface in the Misbourne valley consists of glacial gravel and clay overlying fractured chalk before at depth more competent chalk.

The tunnels carrying the twin bore HS2 at Chalfont St Giles penetrates the upper most part of the Seaford Chalk. This is the most fractured of the entire chalk formation. Chalk contains abundant micro-porosity (up to 45% of volume) and is frequently highly fractured. It is a highly effective reservoir in the south of England for public water (Affinity water) and in the North Sea for oil (Ekofisk or Valhall oil fields). When the chalk is drained the micro-porosity may close and subsidence occur above it, as evidenced in the North Sea with periodic jacking up of the Ekofisk oil platforms. In the Misbourne Valley the upper part of the chalk is, in addition, highly fractured and consists of a rubble zone 16.2m deep, as evidenced by several boreholes at (Chalfont St. Giles pumping station), due to peri-glacial processes and flow of the Proto-Thames across the region approx half a million years ago during Anglian glacial period.

The drilling of the tunnel at this shallow depth poses the following risks:

- **Pollution of the regional aquifer that London sources its water from.** As evidenced by the £77M indemnity offered to Affinity Water, HS2 ltd has recognised a risk to the pollution of the regional aquifer by the drilling of the tunnel at such a shallow depth.
- **Long term damage to the aquifer that London and the northwest Home Counties source their water from.** Cycle time for the chalk aquifer is many thousands of years and therefore any pollution may be present for a very long period.
- **Sourcing of water from outside Chiltern district.** With a polluted

aquifer water will need to be sourced from elsewhere in the south-east or further afield (e.g. Rutland Water).

- **Potential tunnel collapse and ground failure as drilling of the tunnel is within the rubble zone** as evidenced by local boreholes. Limited geophysical and geological data documenting fracture orientation and depth of fractures have been recorded from boreholes.
- *As seen elsewhere in the UK collapse of the subsurface should be expected when, not if, the tunnel transects through fractured shallow chalk.*
- **Collapse from fractures related to damage halo from tunnel.** Numerical modelling of the damage halo around a borehole shows that the ground affected is not only just above the tunnel but surrounding the tunnel. Only by modelling the effect of the tunnel drilling through fractured chalk can this damage halo and its impact on Chalfont St Giles be understood. HS2 ltd have recognised the potential for ground settlement during or soon after construction. Their prediction of this occurring over only 260 metres of the river could be very conservative and also will be a continuous issue after construction not just limited to during and soon after construction.
- Without adequate data from boreholes, however, the numerical model is flawed. Has HS2 ltd gathered this data? The halo could extend many 100's of metres to km's away from the tunnel, affecting local buildings, old and new, and local infrastructure such as pipelines and roads.
- **Drying up of Misbourne river.** The Misbourne is a chalk stream, which are highly limited in number and often referred to as England's rain forests, due to their special status. In addition the Chilterns are an Area of Outstanding Natural Beauty, valued for its chalk streams. The streams are ephemeral. It is highly likely that the drilling of the tunnel at a depth of 19m or shallower through a highly fractured aquifer will lead to the river ceasing to run, with the resulting loss of wildlife and associated habitats. *The Chalfont St Giles section is the most sensitive section. HS2 intersects at exactly the worst place in the entire valley.*

**HS2 ltd themselves have** agreed that it is impossible to be absolutely sure that the major tunnelling operation planned immediately under this complex and fragile environment will have no effect. Although their response appears they would only take action retrospectively which will be too late.

As shown by the indemnity agreement agreed between HS2 ltd and Affinity Water, if the aquifer is polluted, then HS2 ltd have already recognised that there is a risk of pollution. In addition, as highlighted above, there is a significant risk to the local infrastructure, community and indeed area of Outstanding Natural Beauty caused by the shallow depth of the HS2 twin bore tunnel. These risks have to be acknowledged on the current routing of HS2 beneath Chalfont St Giles, either mitigated by shifting the tunnel or alternatively the tunnel depth deepened to alleviate or mitigate the potential risks. *If the tunnel operation is executed as planned all that can be said is that a huge number of consequences will occur and all will look back at a missed opportunity.*

HS2 ltd can offer no assurances that they will not damage the make up of the sensitive chalk stream but instead say they will simply 'make good' if the chalk stream is damaged. This, in our opinion is simply not acceptable when there is good evidence to suggest they could easily avoid running the risk of damage by setting the tunnel considerably deeper or preferably by diverting it away from the village all together.

HS2 ltd have stated that they will monitor the river for signs of damage but the nature of a chalk stream river is that it often flows in erratic cycles. It is expected to flood and it is expected to dry up. If drilling takes place in a flood season any damage will go un noticed for months or perhaps years. If drilling in a dry season, damage will not be registered for months or years by which time HS2 ltd will undoubtedly claim the damage was not caused by them.

If their proposal is to make good, this could involve significant and extensive excavation. Why have HS2 ltd not considered crossing the Misbourne in a more remote location where repair will not adversely effect our community. The twin bore tunnels currently run under the bridge serving traffic to our community and is the main artery of access to housing, shops, doctors surgery, schools etc

HS2 ltd have also chosen the exact point to tunnel under the Misbourne River where is is susceptible to serious and regular flooding. Most recently in 2014 tons of water sat in fields directly above the proposed tunnels and flooding was

still present after three months of persistent pumping from commercial pumps. Flooding in Chalfont St Giles in 2014 was caused by exceptionally high groundwater levels within the chalk aquifer. Local critical infrastructure eg Affinity water pumping station and the BT exchange were affected. Chalfont St Giles is built on the sides of a flood plain. The rising of the aquifer is therefore periodic and the HS2 will go straight through this aquifer. ***Risk of damage to the aquifer is crystal clear (see Bucks CC Flood Assessment Report).***

<https://www.buckscc.gov.uk/media/2983689/Chalfont-St-Giles.pdf>

The community of Chalfont St Giles is concerned that HS2 Ltd have not taken into account the additional stress placed on the make up of the ground during flooding which typically occurs every few years. The community is also concerned that the significant area taken up by the twin bore tunnel will actually increase the regularity and severity of flooding to the village which sits directly above the tunnels.

We request that HS2 Ltd explain why they decided to target the centre of our historic village with tunnels at a depth of 19m or shallower having assured the community that they would by pass the heart of the village at a depth of 100m. We request to see all the possible routes that they consider before drilling directly under the centre of our village.

We request that HS2 Ltd reverse their decision to tunnel under the centre of the historic village or at the very least to significantly increase the depth of the tunnel to avoid the very sensitive make up of the chalk stream.

We insist that the bed of the River Misbourne be reinforced for a significant stretch beyond the boundaries of the tunnels as a precautionary measure no matter where the proposed tunnel pass under it.

Finally we believe that HS2 Ltd will save approximately £ 200-300m by driving the twin bore tunnels through the heart of our village at a minimum depth of 19m or lower instead of adopting the original route that was presented to our village (in the HS2 road show May 2011) which by passed the heart of our community at a depth of 100m. We fear that HS2 are less concerned with the Aquifer, which runs throughout the whole of this area and more interested in cutting financial corners to drive down the cost of the project.

Has reduction of cost been put ahead of damage to the aquifer that helps make up London's drinking water? Are the risks of ground collapse being overlooked? Are HS2 Ltd ignoring the value of the fragile chalk environment that forms the Area of Outstanding Natural Beauty that is the Chilterns and our heritage?

Save St.Giles feel strongly that the current rail project does not link Northern cities to create a genuine Northern Powerhouse, does not connect to airports, does not solve overcrowding and that there are far more viable, less destructive and economically favourable proposals that have not been fully explored.

The above was prepared for Save St.Giles Group by:

### **Ian Cloke**

Ian Cloke has over 27 years experience as a geologist with a background in structural geology modelling faults and fractures. Drilling activities included designing exploration and **production wells through chalk** and other fractured reservoirs. BSc (Dunelm), MSc & PhD (London), Fellow of the Geological Society of London. Lead worldwide exploration for Tullow Oil with activities in 17 countries. Exploration activities can be within sensitive areas such as national parks, affected communities and off shore.

Ian has also been the editor of Special publications for the Geological Society on South East Asia and East Africa and published papers in the Journal of Geological Society London, American Association of Petroleum Geologists and Journal of Asian Earth Sciences as well as been a key note speaker at international scientific conferences throughout Africa, Europe, America and South-East Asia.

### **Haydon Bailey**

Haydon Bailey has a **PhD in Chalk micropalaeontology**, is a Chartered Geologist and has worked as a consultant stratigrapher in the oil and gas industry for forty years. He still **specialises in Upper Cretaceous Chalk stratigraphy**, although work has led to projects throughout much of the geological time scale around Europe, Africa and the Middle East. He's been Chairman and Industrial Liaison Officer of The Micropalaeontology Society and is currently President of the Geologists' Association.

Since 2012 Haydon has been Honorary Lecturer on the M.Sc. course in Applied & Petroleum Micropalaeontology at the University of Birmingham. He also holds the position of Geological & Environmental Adviser to the Chiltern Society (since 2008), when his initial role for the Society was to prepare a report on the underlying geology of the Misbourne valley. **He is a co-author of the Chalk chapter in “*Hertfordshire, Geology & Landscape*” published in 2010.**

### **Bob Older**

Bob Older is a Chartered engineer BSc (hons) in civil engineering, Fellow of the Institution of Civil Engineers with 45 years experience in civil engineering construction and project management, ground engineering, water, drainage and irrigation experience, and specifically in relation to the sensitive chalk streams in the Chilterns. He is Chairman of the Misbourne River Action Group who are considered responsible for nurturing the River Misbourne back to health after many years of lack of care and maintenance. He has been **monitoring the River Misbourne since 2008 and has access to detailed records relating to flow and condition of the river from 1992.**