

Stonehenge and the A303 Tunnel Public Examination

The issue of vibration effects on archaeology cannot be separated from the wider issues of how we consider one of the greatest and oldest areas of archaeology in Britain, and in Europe too.

Of course we relate strongly to the visible standing stones but it is the meaning and use of the much wider landscape which gives it such special significance. And we do not know enough about it, in fact we know for sure very little about it.

The colossal scale proposed of the construction process of the tunnel and the cuttings and retaining walls is in the act of building a major imposition on the landscape that leaves a complex legacy however much of it is mitigated. It is like a serious multiple organ transplant in a human.

Our current knowledge of the impact of vibration on standing structures of various ages is reasonable, or so we think in this generation. Generally the sheer mass of most archaeological or historic structures is impervious to vibrations from boring tunnels to the running of vehicles or railways. Humans and even more so some animals have a far more perceptive awareness of vibrations than heavy physical masonry. Driven piling though can be seriously damaging. Settlement caused by problems that can emerge in the act of tunnelling can also be onerous. However the engineering science of tunnelling has progressed rapidly in the last two decades but still carries risks.

The real concerns about this colossal civil engineering project though are about the secondary impacts from vibrations on natural drainage patterns and ecology in the longer term.

The examples in my wide experience of where vibration has directly caused damage to standing structures are where for instance heavy traffic passing close to loose jointed and filled rubble walls has caused slow erosion of smaller particles. Also an unusual case was where the main A15 with heavy vehicles used to pass close to Lincoln Cathedral Chapter House which was partly founded on a backfilled Roman ditch and traffic vibration caused settlement of the fill with resulting structural damage. (The road has now been diverted.)

There can however be secondary effects from the impact of tunnelling including from vibration and major construction altering the nature of the subsoil and drainage patterns.

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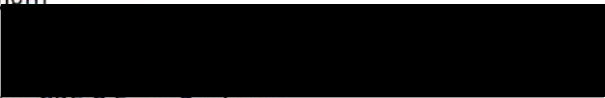
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Human activity in tunnelling and other major civil engineering projects has always been without much long term regard for future generations. Coal mining was of course the worst example and destroyed buildings and archaeology from the later physical collapse of the mine workings. There is even an example of a disused railway tunnel collapsing unexpectedly and causing a building above to collapse. We have little awareness of how to think about the very long term of civil engineering and its safety.

One of the tasks I have in my professional role is as the Engineer to St Paul's Cathedral and the impact of tunnels, deep basements and vibration on the settlement of the Cathedral which is protected by a special Act of Parliament (The St Paul's Depths Act) after serious concerns about the structure in the late 1920's. Another task was the complex repair of the remnants of mediaeval St Stephen's Chapel at the Palace of Westminster where the District line built in the late 19th century had changed the water regime so that the mediaeval timber piles of the chapel had dried out and rotted causing serious damage 100 years later.

Although the visible standing stones at Stonehenge are unlikely to be affected by vibration from construction or traffic as we now know it, the wider landscape is far less determinable. We know little about the much more fragile aspects of this wide site and the impact of the tunnel in the much longer term and even its long term maintenance and use. What will be there from Stonehenge's origin if ever discovered will be immensely fragile.

Because as Engineers in each generation we become more technically competent (or we think so) it does not mean we know enough, hence the serious damage from new roads to historic towns in the 1970's. Stonehenge is from about 400 generations ago, not just 2 or 3, and is of the greatest cultural significance. We must be aware of our technical limitations. We do not know, and maybe never will, enough!


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