

## Proposed Traffic Management Scheme, Bungay

### 1. Introduction

Suffolk County Council propose a traffic management scheme for Bungay town centre to direct one-way traffic north along Lower Olland street and St Mary's Street and South along Trinity Street and Wharton Street. The scheme is expected to lead to an increase in heavy goods vehicle traffic along Trinity Street, Bungay. Suffolk County Council has asked for a desktop report to assess the likely impact of the increased traffic on the stability of the ground in the area of Trinity Street.

My name is Alastair Mckenzie and I am a Chartered Civil Engineer with a Master's Degree in Soil Mechanics and over 25 years experience in geotechnical practice gained with Consultants, Contractors and Local Authorities. I am a member of the British Standards sub-committee for ground investigation and testing and have been responsible for the investigation and analysis of numerous slopes throughout East Anglia.

### 2. Site Description

Trinity Street runs south east from the Market Place to Staithe Road a distance of 280m as shown in Figure 1. The western part has old, largely residential buildings fronting the road along its northern side with commercial buildings along the south. Ancient churches with burial grounds are present on both sides along the centre of the road and some further residential/commercial buildings are present at its junction with Staith Road.

From a site visit I conducted on 8<sup>th</sup> March 2012, I noted that the ground generally slopes down towards the River Waveney which flows south east approximately 170m north east of Trinity Street. The flood plain comprises grassed meadows which extend 60m from the river with a drain marking its south west boundary. Trinity Street is approximately at elevation 13m OD some 8m above the Waveney flood plain. Ground slopes vary locally but typical slopes of 1 in 6 to 1 in 10 are estimated behind the houses along Trinity Street. The slopes are wooded with some grassed areas or lawns. Access to the rear of the properties was not possible so the condition of the slope and any retaining structures could not be assessed.

The road itself is of flexible construction with some signs of cracking associated with utility trenches apparent at either end, however there are no signs of slope movement or subsidence in the road. The north side of Trinity Street has a number of old brick boundary walls adjacent to the footpath some of which lean, however this appears to be localised movement as no signs of overall ground movement are apparent in the adjacent pavement.

The geology maps of the area indicate that Bungay is situated on a the 3<sup>rd</sup> River Terrace Gravels overlying the sands of the Crag Group with Alluvium present across the Waveney flood plain. Thus the deposits within the valley sides are likely to be predominantly granular in nature and although locally variable would be presumed to provide reasonable angles of shearing resistance and be relatively free draining.

The groundwater table is anticipated to flow towards the river with its level at the toe of the slope at the drain level along the edge of the flood plain. An old well is present on the slope at the bottom of Borough Well Lane with is said to have been disused in the early 19<sup>th</sup> century. From its location I estimated that the main groundwater table is at least 3m below ground level along Trinity Street.

### 3. Ground Borne Vibrations

The effects of traffic induced vibrations on buildings have been researched by the Transport Road Research Laboratory as discussed in their report RR246 "Traffic Induced Vibrations in Buildings" (G R Watts, 1990). The research concluded that there was no evidence that traffic induced vibrations had any significant damaging effect on buildings. The research also noted that there was some evidence that a small amount of superficial damage could result from sustained exposure to very high levels of ground borne vibration. These vibrations are shown to be greater in soft soils such as peat or alluvium and to increase with traffic speed and irregularity in the road surface. The soils below Trinity Street are likely to be well graded granular materials of relatively low sensitivity to vibration with low traffic speeds and a reasonable road surface. Consequently high levels of ground borne vibration and hence superficial damage to buildings would not be expected as a result of this scheme.

### 4. Ground Stability

To provide a comprehensive assessment of the ground stability in the area we would need a detailed ground survey to identify the local slopes and retaining structures, the installation of piezometers to measure seasonal changes in the groundwater levels and an intrusive investigation to establish the soil profile and strength parameters for use in an analysis.

The proposed scheme could increase the frequency of heavy vehicles on the road, however these additional loads are normally localised and distributed within the road structure. The exception would be if there are basements or cellar walls present close to the edge of the road. In these circumstances the effects of cyclic lateral loading could lead to damage to the substructure. It is recommended therefore that a survey is carried out to confirm the presence of any basements or cellars adjacent to the road and to assess their condition.

Considering the information available to me I would conclude that whilst the passing of heavy vehicles will generate noise and vibration which may be apparent to people, it will not have a significant impact on ground stability in this area. Provided that any basements or cellars are in a reasonable structural condition and do not extend beneath the road pavement, the additional traffic is unlikely to cause new or additional settlement to buildings.

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