



The Legacy of the Past: Geotechnical challenges from coal mining impacting major rail infrastructure.

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Abstract

The legacy from a long history of mining, quarrying and subsequent landfilling can present significant geotechnical challenges to infrastructure schemes. When upgrading existing rail lines through congested urban corridors there is little opportunity to avoid the risk. Understanding the legacy of the past and the risk posed to the construction and operation of both existing and new track and structures is key to building resilient structures and a sustainable railway for the future. The paper discusses how the coal mining risk was managed and through dialogue with Network Rail a balanced approach (considering safety, cost and resilience) was adopted to determine appropriate mitigation. It then discusses the challenges implementing drill and grout mitigation in a live rail environment, around buried infrastructure, through landfill areas and adjacent to water courses. All required as mitigation for a new flyover and viaduct structure between Huddersfield and Dewsbury.

Keywords: Coal mining; risk assessment; mine workings; mitigation; grouting; structure interaction.

1 Introduction

The Transpennine Route Upgrade (TRU) is delivering major upgrades to lines and stations between Manchester, Leeds and York in the North of England. Increasing capacity and electrifying the route will deliver faster, more reliable and greener journeys for the local communities. Between Huddersfield and Dewsbury, the 14km section of route known as West 3 (W3) (herein referred to as 'the route') is discussed in further detail here. The route is geotechnically interesting, with challenging ground and major structural interventions both around the existing live railway, and off track.

The route crosses a landscape with a legacy of historical coal mining, quarrying and subsequent landfill, which introduce risks that need to be understood and managed to provide long term, sustainable and resilient assets.

Geologically, the route is underlain by the Pennine Lower Coal Measures (PLCM) bedrock, including a number of coal seams. Evidence of likely working of seams has been found in a significant number of the ground investigation (GI) holes. This has greatly aided the development of robust ground models and assessing the risk of collapse or settlement and thus the need for mitigation or not, early in the design process.

Alongside the development of outline designs, mining risk assessments (MRA) and a mining risk mitigation strategy were developed in consultation with Network Rail (NR). It wasn't economically viable to mitigate all possible risk. Therefore, a refined risk assessment process was needed to consider the cost of mitigation vs likelihood and impact of possible shallow working collapse causing a major event to the railway. Through this