

Investigation of Yard Seam Workings for the Proposed Newcastle Light Rail Project

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Abstract : The proposed Newcastle Light Rail is a key part of the revitalisation of Newcastle, NSW and will provide a frequent and reliable travel option throughout the city centre, running from Newcastle Interchange at Wickham to Pacific Park in Newcastle East, a total of 2.7 kilometers in length. Approximately one-third of the route, along Hunter and Scott Streets, is subject to potential shallow underground mine workings. The extent of mining and seams mined is unclear. Convicts mined the Yard Seam and overlying Dudley (Dirty) Seam in Newcastle sometime between 1800 and 1830. The Australian Agricultural Company mined the Yard Seam from about 1831 to the 1860s in the alignment area. The Yard Seam was about 3 feet (0.9m) thick, and therefore, known as the Yard Seam. Mine maps do not exist for the workings in the area of interest and it was unclear if both or just one seam was mined. Information from 1830s geological mapping and other data showing shaft locations were used along Scott Street and information from the 1908 Royal Commission was used along Hunter Street to develop an investigation program. In addition, mining was encountered for several sites to the south of the alignment at depths of about 7 m to 25 m. Based on the anticipated depths of mining, it was considered prudent to assess the potential for sinkhole development on the proposed alignment and realigned underground utilities and to obtain approval for the work from Subsidence Advisory NSW (SA NSW). The assessment consisted of a desktop study, followed by a subsurface investigation. Four boreholes were drilled along Scott Street and three boreholes were drilled along Hunter Street using HQ coring techniques in the rock. The placement of boreholes was complicated by the presence of utilities in the roadway and traffic constraints. All the boreholes encountered the Yard Seam, with conditions varying from unmined coal to an open void, indicating the presence of mining. The geotechnical information obtained from the boreholes was expanded by using various downhole techniques including; borehole camera, borehole sonar, and downhole geophysical logging. The camera provided views of the rock and helped to explain zones of no recovery. In addition, timber props within the void were observed. Borehole sonar was performed in the void and provided an indication of room size as well as the presence of timber props within the room. Downhole geophysical logging was performed in the boreholes to measure density, natural gamma, and borehole deviation. The data helped confirm that all the mining was in the Yard Seam and that the overlying Dudley Seam had been eroded in the past over much of the alignment. In summary, the assessment allowed the potential for sinkhole subsidence to be assessed and a mitigation approach developed to allow conditional approval by SA NSW. It also confirmed the presence of mining in the Yard Seam, the depth to the seam and mining conditions, and indicated that subsidence did not appear to have occurred in the past.

Keywords : downhole investigation techniques, drilling, mine subsidence, yard seam

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