



Longwall 905 – End of Panel

Geotechnical Summary Report – Gibraltar Drive and Quirkles Lane

09 June 2023

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Project Name	South32 IMC Longwall 905		
Subject	EoP, Geotechnical Summary Report – Nos. 5,8,10,12,14 Gibraltar Drive, Razorback and No. 135 Quirkles Lane, Menangle		

Dear Richard

1. Introduction

Following the completion of mining of Longwall 905 in IMC – South32 Area 9, an End of Panel (EoP) report is being prepared by IMC.

Following completion of the mining of Longwall 905, GHD undertook site inspections of properties above or in close proximity to the Razorback escarpment cliffs and /or steep slopes, including Nos. 5,8,10,12 and 14 Gibraltar Drive and 135 Quirkles Lane. These inspections follow earlier pre-mining (Longwall 905) inspections of the same properties conducted in August, September 2022 (Gibraltar Drive), and November/December 2022 for 135 Quirkles Lane.

1.1 Purpose of this report

This summary report outlines the general geotechnical condition of the steep slopes and/or cliffs and other relevant surface features observed on each of the above rural residential properties during recent inspections of the properties by an experienced geotechnical engineer from GHD.

2. Limitations

This report: has been prepared by GHD for Illawarra Coal Holdings Pty Ltd and may only be used and relied on by Illawarra Coal Holdings Pty Ltd for the purpose agreed between GHD and Illawarra Coal Holdings Pty Ltd as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Illawarra Coal Holdings Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect. The report should be read in conjunction with the GHD Standard Sheets included as Appendix A.

GHD has not been involved in the preparation of the End of Panel (EoP) report by Illawarra Coal Holdings Pty Ltd and has had no contribution to, or review of the EoP report other than in the preparation of this document and supplementary individual inspection reports].

The opinions, conclusions and any recommendations in this report are based on information obtained from specific site observation points. Site conditions at other parts of the site may be different from the site conditions found at the specific observation points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as dense vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

GHD has prepared this report on the basis of information provided by Illawarra Coal Holdings Pty Ltd and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

3. Summary of geotechnical observations

No 5 Gibraltar Drive, Date of Inspection – 1 May 2023 by Jon Thompson CPEng

When compared to site observations made in August 2022, no changes were observed in relation to geotechnical site surface conditions around the brick residence, concrete driveway, in-ground water and sewer tanks and earth dam. No changes to surface topography were observed over the mown grass slopes around the house, or steep slopes and cliff line below the southern side of the property. No mining related surface features observed.

No 8 Gibraltar Drive, Date of Inspection – 1 May 2023 by Jon Thompson CPEng

When compared to site observations made in August 2022, no changes were observed in relation to geotechnical aspects of the site's surface conditions around the brick residence and large metal clad shed, concrete driveway and water storage and sewer tanks. Possible minor additional displacement (tilting) of the mass concrete block retaining wall downslope of the house has occurred since our previous observations in August 2022. The displacement of this wall has occurred as a result of issues not related to mining. No changes observed to the steep slopes and cliff line below the southern and western sides of the property. No mining related surface features were observed.

No 10 Gibraltar Drive, Date of Inspection – 2 May 2023 by Jon Thompson CPEng

When compared to our site observations made in August 2022, no changes were observed in relation to geotechnical aspects of the site around the concrete block residence and garage, concrete carport slab and concrete water and sewer tanks. Parts of the gravel driveway have deteriorated with some large potholes, assessed to be likely a result of significant periods of wet weather. A gap in the concrete path down the northern side of the house remained similar to that previously observed in September 2022. A buried service has been installed that crosses the rear concrete path and the path has been repaired at this location. Extensions to the southern side of the house had been completed. No changes were observed to the landscaped areas in upper parts of the property or to the slopes downhill. No mining related surface features were observed.

No 12 Gibraltar Drive, Date of Inspection – 2 May 2023 by Jon Thompson CPEng

When compared to our site observations of this property that were made in September 2022, no changes were observed in relation to geotechnical aspects of the site around the brick residence, brick granny flat/garage, large metal clad shed, concrete in-ground water storage and sewer tanks, above ground water storage tanks, and timber and mass concrete block retaining walls. Minor separation of the concrete edging along the asphalt sealed driveway was noted, consistent with shrinkage of the underlying clay soils (that are likely reactive). Further local erosion of the steep cut batter above the dam had occurred. Apart from some minor erosion and loss of rock fragments from the highly fractured zones, the low sandstone cliffs located downslope of the dam have remained generally as described in our September 2022 report. Some minor erosion has occurred in the colluvium downslope of the cliffs. Elsewhere on this property, the steep slopes remained as observed during our site observations of September 2022. No mining related surface features were observed.

No 14 Gibraltar Drive, Date of Inspection – 15 May 2023 by Jon Thompson CPEng

When compared to our site observations made in September 2022, no changes were observed in relation to geotechnical aspects of the site around the brick residence, brick garage, metal clad shed, concrete in-ground water storage and sewer tanks, above ground water storage tanks, and retaining walls. Some cracking of the clay soil fill batter has occurred above the mown grass terrace in the lower rear yard, attributed to recent drying back of the clay fill soils in this area following extended periods of wet weather prior to May 2023. Further local erosion of the steep cut batter along the high side of the farm dam had occurred, however the dam wall has remained intact with no recent erosion or instability observed.

The low sandstone cliffs located downslope of the dam have remained as described in our September 2022 report. A recent landslide has occurred in the colluvium downslope of the lower sandstone cliff and close to the eastern side boundary of No. 14 Gibraltar Drive with No 16 Gibraltar Drive. The footprint of the landslide had dimensions of approximately 10 m across the slope and 20 m downslope and appeared to be relatively shallow depth (1 m to 2 m), including some fallen trees. The landslide has occurred on a steep hillside where significant slope instability has occurred in the past and was inferred to have been triggered by concentrated surface water runoff during heavy rain. Elsewhere the steep colluvial slopes remained generally as observed during our site observations of September 2022. No mining related surface features were observed.

No 135 Quirkles Lane, Date of Inspection – 15 May 2023 by Jon Thompson CPEng

When compared to our site observations of the cliff line and steep slopes in the upper part of No 135 Quirkles Lane made in November/December 2022, a few minor rock topples from the vertical sandstone cliffs were observed, comprising one or two boulder-sized rocks – this was evident in the exposed high cliffs near the eastern and western ends of the high cliff lines. Surface erosion had occurred over the exposed soils at the cliff top areas where goats had eaten out the surface vegetation. The rock topples and surface erosion are considered to be a result of periods of heavy rainfall and subsequent runoff from the plateau area and are not mining related. No property is in jeopardy in proximity to the cliff line, as buildings and sheds on No 135 are located over 300m downslope to the northeast of the escarpment cliffs and steep slopes. No mining related surface features were observed.

Appendices

Appendix A

GHD Standard Sheets

GENERAL NOTES



GHD

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The report contains the results of a geotechnical investigation or study conducted for a specific purpose and client. The results may not be used or relied on by other parties, or used for other purposes, as they may contain neither adequate nor appropriate information. In particular, the investigation does not cover contamination issues unless specifically required to do so by the client.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the report are excluded unless they are expressly stated to apply in the report.

TEST HOLE LOGGING

The information on the test hole logs (boreholes, test pits, exposures etc.) is based on a visual and tactile assessment, except at the discrete locations where test information is available (field and/or laboratory results). The test hole logs include both factual data and inferred information. Moreover, the location of test holes should be considered approximate, unless noted otherwise (refer report). Reference should also be made to the relevant standard sheets for the explanation of logging procedures (Soil and Rock Descriptions, Core Log Sheet Notes etc.).

GROUNDWATER

Unless otherwise indicated, the water depths presented on the test hole logs are the depths of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater depth may differ from this recorded depth depending on material permeabilities (i.e. depending on response time of the measuring instrument). Further, variations of this depth could occur with time due to such effects as seasonal, environmental and tidal fluctuations or construction activities such as a change in ground surface level. Confirmation of groundwater levels, phreatic surfaces or piezometric pressures can only be made by appropriate surveys, instrumentation techniques and monitoring programmes.

INTERPRETATION OF RESULTS

The discussion or recommendations contained within this report normally are based on a site evaluation from discrete test hole data, often with only approximate locations (e.g. GPS). Generalised, idealised or inferred subsurface conditions (including any geotechnical cross-sections) have been assumed or prepared by interpolation and/or extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

CHANGE IN CONDITIONS

Local variations or anomalies in ground conditions do occur in the natural environment, particularly between discrete test hole locations or available observation sites. Additionally, certain design or construction procedures may have been assumed in assessing the soil-structure interaction behaviour of the site. Furthermore, conditions may change at the site from those encountered at the time of the geotechnical investigation through construction activities and constantly changing natural processes.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed or reported should be referred to GHD for appropriate assessment and comment.

GEOTECHNICAL VERIFICATION

Verification of the geotechnical assumptions and/or model is an integral part of the design process - investigation, construction verification, and performance monitoring. Variability is a feature of the natural environment and, in many instances, verification of soil or rock quality, or foundation levels, is required. There may be a requirement to extend foundation depths, to modify a foundation system and/or to conduct monitoring as a result of this natural variability. Allowance for verification by appropriate geotechnical personnel must be recognised and programmed for construction.

FOUNDATIONS

Where referred to in the report, the soil or rock quality, or the recommended depth of any foundation (piles, caissons, footings etc.) is an engineering estimate. The estimate is influenced, and perhaps limited, by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The material quality and/or foundation depth remains, however, an estimate and therefore liable to variation. Foundation drawings, designs and specifications should provide for variations in the final depth, depending upon the ground conditions at each point of support, and allow for geotechnical verification.

REPRODUCTION OF REPORTS

Where it is desired to reproduce the information contained in our geotechnical report, or other technical information, for the inclusion in contract documents or engineering specification of the subject development, such reproductions must include at least all of the relevant test hole and test data, together with the appropriate Standard Description sheets and remarks made in the written report of a factual or descriptive nature.

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