Doc Ref:	JCL-1688-01-TN-001
Title:	Opencast Technical Note
Date:	26th February 2025
Prepared By:	Calum Reford, BSc (Hons), MSc
Reviewed By:	Stephen Riley, BSc, CEng, MICE.
Client:	Jarvale Construction Ltd.

1.0 INTRODUCTION

1.1 This Technical Note has been prepared in accordance with instructions from Jarvale Construction Ltd., on behalf of their client, Jacquet UK, to support their planning application to Barnsley Metropolitan Borough Council for the proposed construction of a new storage and manufacturing building at Rockingham House, Wentworth Way, Tankersley, S75 3DH.

Planning History

1.2 The application was submitted to the Local Planning Authority (LPA) in October 2023, which included a Phase 1 Desktop Study prepared by Inspire Design and Development (doc ref: JCL-1688-01-LCRM-001). Comments were received from the Mining Remediation Authority dated 15th February 2024 with *substantive concern* with regard to the coal mining legacy on the proposed development, and that further investigative works should be undertaken to confirm the underlying ground conditions. It was recommended by the Authority that these investigations should be conducted prior to the determination of the planning application. Any remedial, preventative, and mitigation measures should then be proposed to address issues of land instability.

1.3 A Phase 2 Ground Investigation was instructed by Jarvale Construction in May 2024 following the previous comments from the Mining Remediation Authority. The Phase 2 *Ground Investigation Report*, prepared by Silkstone Environmental Ltd. and dated November 2024, was submitted to the LPA on 4th December 2024. The Phase 2 detailed the presence of opencast backfill which extends to depths of between 4.50m and 16.00m begl, with the shallowest seam in the northeast corner (4.50m begl). The report considered that there is potential of internal opencast benching within this part of the site.

1.4 Following the submission of the Phase 2 Ground Investigation, comments from the Mining Remediation Authority were received on 17th December 2024, with the response '*Further Information Required*', as detailed below:

The applicant and their technical consultant should therefore be requested to demonstrate that layout of the storage building avoids any buried opencast high wall present. We would also request that additional commentary is provided in respect of the shallow mining situation beneath the site. The above should outline any additional investigations necessary and inform any remedial or mitigation measures required to ensure the safety and stability of the site.

Where layouts cannot be amended to avoid the characterised high wall feature, for example where operational reasons dictate otherwise or sites are constrained, the development proposal should be supported by a thorough planning justification for this and a robust engineering strategy, in compliance with CIRIA (C758D), to demonstrate how the development will be made safe and stable.

1.5 This report seeks to address the Mining Remediation Authority's comments of 17th December by providing a review of Opencast Mining Plans available from the Mining Remediation Authority and obtained on 28th January 2025. This technical note will also provide a planning justification for the proposed building's location in relation to the wider site constraints and will also provide an overview of the engineering solution developed by Jarvale Construction and HBPW Consulting.

2.0 OPENCAST MINING AREA

2.1 Opencast mining is a surface mining technique used to extract mineral deposits which are located close to the surface and spread over a large area. Once the area has been subject to the operation, the excavated area is backfilled using rock, and loose graded material to restore the land to its previous state. The remnants of the operation result in a *low wall* and a *high wall*, a steep and exposed face of rock left behind, which marks the boundary between the mined area and the undisturbed land. The outline of the high wall can typically be established by reviewing the extent of known Opencast mining areas. A record of these areas is kept by the Mining Remediation Authority.

2.2 Opencast mining records were obtained from the Mining Remediation Authority on 27th January 2025. The drawing OE/COMP/03/114 *Tankersley Farm* (Appendix A) shows the extent of the area which was subject to opencast mining operations. In order to further understand how this affects the current development proposals, the extents from OE/COMP/03/114 was overlayed with the proposed site layout on the drawing JCL-1688-01-PL-001 *Opencast Mining Extents* (Appendix B).

2.3 As can be seen from JCL-1688-01-PL-001 *Opencast Mining Extents*, the approximate boundary of the low wall and high wall are highlighted in magenta, with the opencast extent lightly shaded. The opencast area extends through approximately 60% of the application site, including the whole area where the proposed storage and manufacturing building will be located. The opencast area affects much of the southeast area of the site but avoids the car park and northeast service yard.

3.0 PLANNING JUSTIFICATION

Development Background

3.1 Jacquet is the largest independent stainless-steel profiler in Europe, with their UK operations headquartered in Tankersley, South Yorkshire. The proposed development seeks to provide additional storage and workshop space to expand the existing facility, investing in job creation and contributions to the local economy.

3.2 As part of their expansion, Jacquet require a new 2,000sqm building to contain cutting equipment and storage of raw materials and finished products. In addition, the building is required to be designed to allow for an overhead lifting system to assist with the movement of materials around the building. The new building should also be located immediately adjacent to the existing building so as to minimise movement between both manufacturing halls.

Site Constraints

3.3 The site has several constraints which have been taken into account when considering the location of the proposed building. These constraints are explored further below.

Option 1 - Area to the Southeast

Figure 1 - Possible Location of Option 1

3.4 Consideration was initially given to the location of the proposed building along the southeast boundary of the site. However, this area is significantly vegetated and

overgrown, as recorded by the Arboricultural Assessments. In addition to this, a total of five 'ponds' were identified by the Preliminary Ecological Assessment as being possible habitat for Great Crested Newts (GCN). This location option would also result in the building being located on the high wall. Therefore, in order to minimise the development's impact on ecology and biodiversity, and the location on the high wall, it was determined that location of the building within this area would not be suitable.

Option 2 - Area to the Southwest of Rockingham House

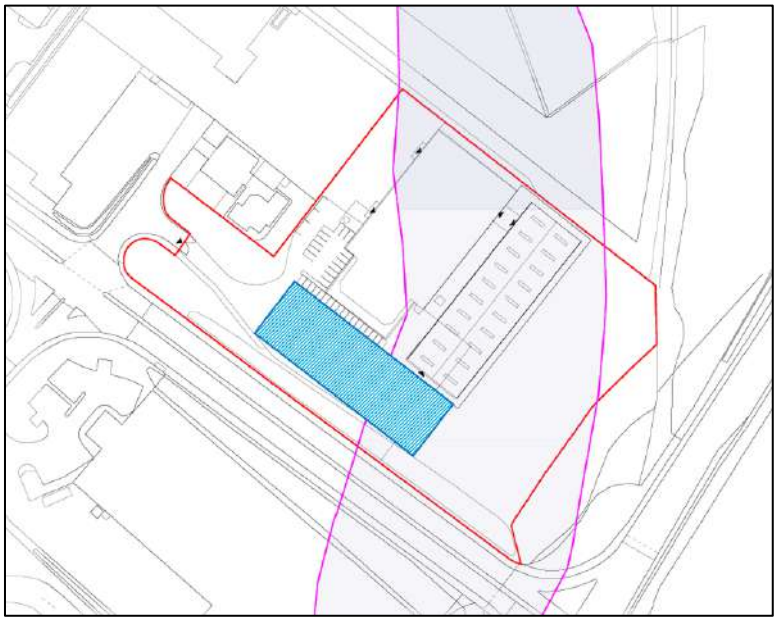


Figure 2 - Possible Location for Option 2

3.5 Consideration was given to locating the building immediately to the southwest of the existing building known as Rockingham House. The location of the building in this area would be within the existing car park which serves the site. It was considered that development in this area would mean the significant loss of parking spaces, with the only relocation of the car park to the southeast ecological area. This option was therefore considered to be unsuitable.

3.6 While the placement of the building in this area would be largely outside of the opencast extent, however, it does site on the low wall. The layout would not suit the applicant's operations due to the layout of the existing Rockingham House. The proposed building would be adjacent to the applicant's office area rather than providing a direct connection to the manufacturing hall, to ease the movement been both manufacturing areas. As such, this option was considered to be unsuitable.

Option 3 - Area to the West of Rockingham House

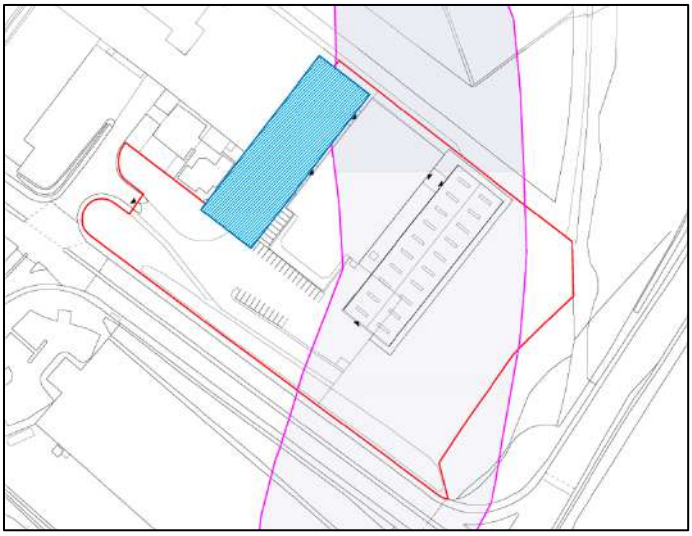


Figure 3 - Possible Location of Option 3.

3.7 Locating the proposed building immediately to the west of Rockingham House was explored. While this area is somewhat outside of the opencast extent, it forms part of the existing external storage yard and additional car parking facilities. This location was considered unsuitable as development would cause the loss of the existing storage yard and parking area. Furthermore, locating the building in this area would not achieve the 2,000sqm floorspace required to meet the applicant's space requirements for their operations. This location would also mean that the building would site on the low wall.

Option 4 – Immediately to the Southeast of Rockingham House (Preferred Option)

Figure 4 - Location of Option 4.

3.8 This site is proposed in this location as it is immediately adjacent to the manufacturing hall of Rockingham House, providing direct movement between both halls without traversing the existing office areas. This location, while within the opencast extent, is the preferred location as it minimises the loss of any sensitive ecological features and maintains the existing location of the car park. Furthermore, it can also be seen from the drawing JCL-1688-01-PL-001 *Opencast Extents* that all possible options for the siting of the building would be affected by the opencast area to some extent.

Planning Policy

3.9 Despite these constraints, the site is allocated within the Barnsley Local Plan as an Existing Employment Site within the larger Wentworth Way Industrial Estate, under Policy E4. Policy LG1 also states that the Local Planning Authority will support the economic growth of the Sheffield City Region to maximise the opportunities and benefits of Barnsley's favourable location within the region.

Summary

3.10 Following assessment of various positions for the proposed building, it is clear that Option 4 is the most appropriate location for the building as this location will permit the direct movement between both manufacturing halls and reduce the overall ecological impact of the proposed development. While this position is within the opencast area, it should be noted that all options explored within this exercise were subject to the opencast area and high wall. As such, it is considered that an appropriate engineering solution can be devised to mitigate the issues with siting the building within the opencast area.

4.0 ENGINEERING JUSTIFICATION

4.1 A full Engineering Statement has been prepared by HBPW Consulting Engineers (doc ref: SL07272-HBPW-XX-XX-RP-C-0001), submitted in conjunction with this technical note. The report provides an engineering assessment of the proposed substructure solution for the proposed new storage and manufacturing building.

4.2 The HBPW report recommends a reinforced concrete ground beam foundation which will manage potential differential settlement and is considered to be a common approach for buildings located on made ground. Full analysis and details of the proposed foundation work can be found within the HBPW report contained within Appendix C of this report, and therefore, has not been repeated here.

4.3 It is considered that a suitably worded planning condition could applied for full details of the proposed foundation design to be submitted to the Local Planning Authority of written approval prior to the commencement of development on the site. This approach is often considered to be common practice in most cases.

5.0 Conclusions & Recommendations

5.1 This Technical Note has been prepared to support the planning application to Barnsley Metropolitan Borough Council for the proposed construction of a new storage and manufacturing building at Rockingham House, Wentworth Way, Tankersley. This report seeks to address the Mining Remediation Authority's comments of 17th December 2024 by providing a review of Opencast Mining Plans, available from the Mining Remediation Authority and obtained on 28th January 2025.

5.2 Opencast records (Appendix A) show the extent of the area, which was subject to opencast mining operations, and overlaid on the proposed site layout as shown on the drawing JCL-1688-01-PL-001 *Opencast Mining Extents*. The drawing shows the approximate location of the high wall highlighted in magenta, with the opencast extent shaded. The opencast area extends through approximately 60% of the total application site area.

5.3 To assess the suitability of the building's position, four options were considered, and are summarised below:

- Option 1 – This option was considered unsuitable due to the findings of the Preliminary Ecological Assessment as this area has been identified as being possible habitat for Great Crested Newts and its location on the high wall.
- Option 2 – This option was considered unsuitable as this area of the application site is currently used to serve the wider site's car parking needs. The site also sits on the low wall. The proposed building in this location would result in a significant loss of parking spaces.
- Option 3 – This location was considered to be unsuitable as the development would result in the loss of the existing storage yard and additional parking area. This position would also mean the building would sit on the low wall. Furthermore, this location would not achieve the 2,000sqm floorspace required to meet the applicant's spatial requirements for their operations.
- Option 4 – This location is the preferred location for the proposed building as it minimises the loss of any sensitive ecological features and maintains the existing location of the car park. It also allows the applicant's requirements for ease of movement between both manufacturing halls. While within the opencast area, this location avoids the high wall, and it is considered that an appropriate engineering solution could be provided.

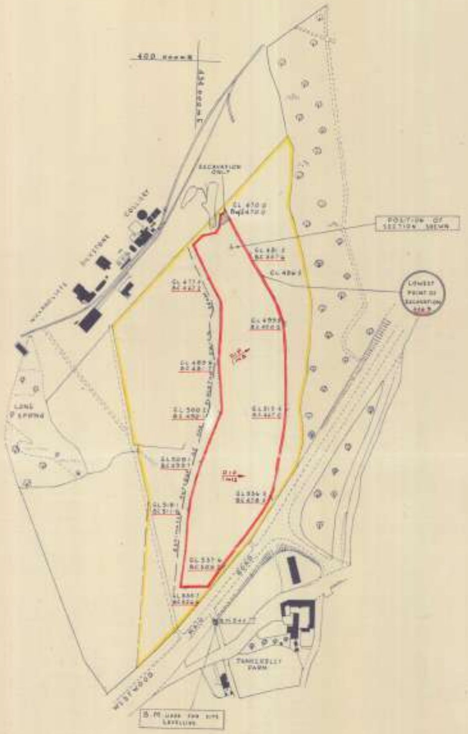
5.4 The HBPW Consulting Engineers Engineering Statement can be found in Appendix C of this report. It was determined by the Consulting Engineer that while opencast benching may exist beneath the wider application site as whole, no benching is likely to be located immediately beneath the footprint of the proposed building.

5.5 HBPW Consulting Engineers proposes a foundation arrangement comprising a 'stiff' reinforced concrete ground beam which is continuous to the full perimeter of the building. This method is commonly used for lightweight buildings founded on made ground.

5.6 Overall, it is considered that the siting of the proposed building within this location is suitable in both planning and engineering terms. A suitable foundation design is considered to be viable and will be submitted prior to the commencement of the proposed development. As such, support for the proposed development is encouraged from the Mining Remediation Authority and the Local Planning Authority.

APPENDIX A OPENCAST ABANDONMENT PLANS

N.E. 420.



LEGEND

LOCATION

1:2500 SCALE ORDNANCE SHEET REFERENCE	282 : II N 7
DATE OF ORDNANCE SHEET	1931
NAME OF SITE	TANKERSLEY FARM
LOCATION OF SITE	7 MILES N.N.W. of SHEFFIELD
COUNTY	YORKSHIRE
PARISH	TANKERSLEY

QUANTITIES WORKED

TOTAL AREA REQUISITIONED 21·205 ACRES. SHEWN

TOTAL AREA WORKED EXCLUDING BATTERS 8·00 ACRES

TOTAL COAL RECOVERED FROM ABOVE 40,788 TONS

NAMES OF SEAMS WORKED FOR ABOVE TONNAGE (SEAMS NAMED FROM LEFT TO RIGHT IN GEOLOGICAL DESCENDING ORDER)	FLOCKTON THICK					
AREA OF COAL SEAM WORKED COLOUR EDGED (SEAMS COLOURED FROM LEFT TO RIGHT IN GEOLOGICAL DESCENDING ORDER)						
TOTAL OLD WORKING VOIDS IN COAL SEAM IN CUBIC YDS.	—					
AREA OF SEAM WHERE OLD WORKING VOIDS WERE LOCATED	—					
DIP AND DIRECTION OF EACH SEAM SHEWN	1 in 8					
REDUCED LEVELS TO ORDNANCE DATUM SHEWN (RELATIVE TO NEWLYN) GROUND LEVEL / BOTTOM OF COAL	GL 536·5 BC 478·2					
FAULTS SHEWN WITH THROW IN FEET ON DOWNTHROW SIDE						

VERTICAL SECTION THROUGH ALL SEAMS

GENERAL DESCRIPTION

TYPE OF LAND	AGRICULTURAL
NATURE OF OVERBURDEN	YELLOW and GREY MUDSTONE and CLAY
NATURE OF COAL	GOOD QUALITY
SPECIAL REMARKS	

OPERATIONAL DATA

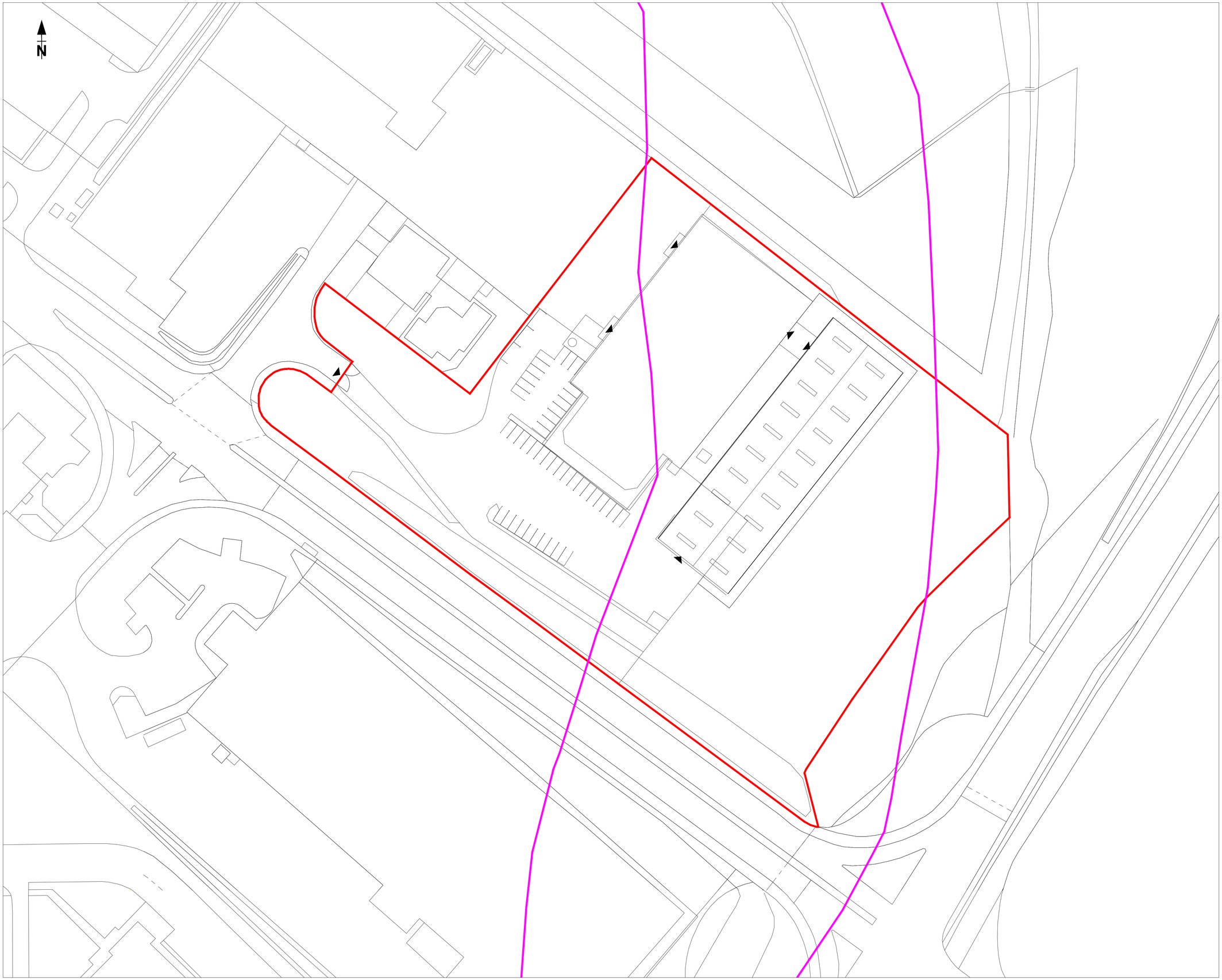
DATE REQUISITIONED	3 - 8 - 44
COMMENCEMENT OF COALING	28 - 12 - 44
COMPLETION OF COALING	21 - 11 - 45
COMPLETION OF RESOILING	
SITE HANDED BACK TO AGRICULTURE	
FINAL DEREQUISITION OF SITE	31 - 8 - 53

COPIES TO	DATE	INITIALS
Mining Records (2)		
R.L. Surveyor (1)		
Geological Survey (1)		

NATIONAL COAL BOARD OPENCAST EXECUTIVE 85/87 JERMYN STREET LONDON, S.W.1.	LAND SURVEY BRANCH DRAWN BY: R.H.G. DATE: 18th December 1961 CHECKED BY: DATE: SCALE 1:2500	NAME OF ZONE OR CONTRACT	NAME OF SITE	TANKERSLEY FARM	SITE REFERENCE NUMBER 030 238 B OPERATIONAL CONTRACT NUMBER CO 39/100984	DRAWING NUMBER OE/COMP/03/114.

OE/CLS/7a

APPENDIX B OPENCAST EXTENTS PLAN



NOTES:

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL MEASUREMENTS ARE IN METERS UNLESS OTHERWISE STATED.
3. DRAWING NOT ISSUED FOR CONSTRUCTION.
4. BASED ON DRAWING NUMBER OE/COMP/O3/114 OBTAINED FROM THE COAL AUTHORITY ON 27/01/25

KEY:

- SITE BOUNDARY
- APPROXIMATE AREA OF OPENCAST OBTAINED FROM COAL AUTHORITY RECORDS

REV	DATE	NAME	CHECK	NOTE

DRAWING STATUS:

FOR APPROVAL

CLIENT

JARVALE CONSTRUCTION

PROJECT

JACQUET, TANKERSLEY

DRAWING TITLE

OPEN CAST MINING EXTENTS PLAN

DRAWN	CHECKED	APPROVED
NGP	CGR	CGR

DATE	SCALE @ A1
11 February 2025	1:500

DRAWING No.	REVISION No.
JCL-1688-01-PL-001	

APPENDIX C HBPW FOUNDATION DESIGN REPORT

JACQUET UK LTD

ENGINEERING STATEMENT ON PROPOSED SUBSTRUCTURE SOLUTION

SL07272-HBPW-XX-XX-RP-C-0001

February 2025

HBPW
CONSULTING ENGINEERS

HBPW
CONSULTING ENGINEERS

ENGINEERING STATEMENT ON PROPOSED SUBSTRUCTURE SOLUTION

DOCUMENT HISTORY SHEET

Issue	Status	Purpose/Description	Originator	Checker	Date
P01	S4	Initial Issue	E. Parry	P. Monaghan	24.02.2025

HBPW
CONSULTING ENGINEERS

CONTENTS

HBPW
CONSULTING ENGINEERS

1 INTRODUCTION

It is proposed to construct a new single storey storage and manufacturing warehouse on vacant land adjacent to the existing Jacquet UK Ltd facility. The site is located off Wentworth Way on the Wentworth Industrial Park, Tankersley. The location of the proposed warehouse is shown on the below image:

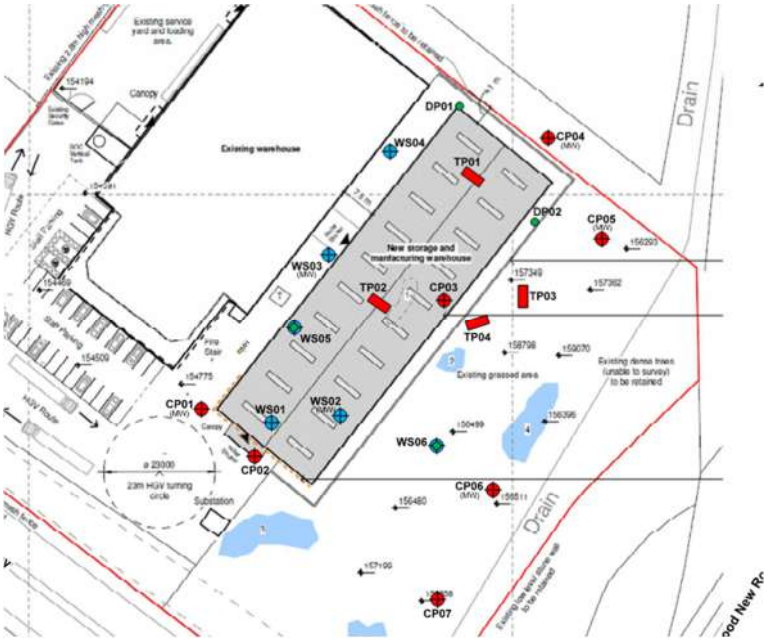
The existing facility comprises a multi storey office building with engineering workshop towards the rear. It is understood that the foundations to the existing buildings is ground bearing.

1.1 SITE HISTORY

It is known that the site has been subject to opencast mining for coal in the past, records provided by the Coal Authority indicates that the site was backfilled following completion of coal extraction in and around 1946.

An overlay of the Coal Authority (CA) Abandonment Plan showing the extent of the opencast works and the current site image is shown below, it shows the boundary of the opencast lying directly below the footprint of the proposed warehouse:

A ground investigation was undertaken at the site in July 2024 by Silkstone Environmental, the investigation involved 7no. cable percussive (CP01-CP07) boreholes excavated to determine the full depth of made ground. The results from the Ground Investigation are described in the "Updated Ground Investigation Report" by Silkstone Environmental Ltd dated November 2024. The positions of CP01 - CP07 are shown on the below image:



2 ENCOUNTERED STRATA

As expected, made ground was encountered in all 7 boreholes, with varying depths of 4.5m in CP05 and 16.0m in CP04, opencast backfill was encountered in all boreholes.

The made ground is described as gravely clay, SPT N values taken within the depth of opencast backfill are summarised below:

CP01, N= 5, 41, 14, 12, average ignoring 5 and 42 = 13

CP02, N= 11, 31, 21, 20, 22, average ignoring 31 = 18.5

CP03, N= 9, 9, 11, 11, 15, 30, average ignoring 30 = 11

CP04, N=19, 11, 10, 15, 13, 19, 25, 19, 17, 34, average ignoring 34 = 16

CP05, N= 8, 9, 42, average ignoring 42 = 9. Note located away from the proposed warehouse

CP06, N= 8, 7, 9, 11, 16, 15, 21, 15, average = 13

CP07, N= 4, 14, 8, average = 9. Note located away from the proposed warehouse

The average range for the N value (ignoring CP05 and CP07) varies between 11 and 18.5, using the simple relationship to calculate the strength of the made ground of 5xN, it gives a Cu

value for the made ground in the range of 55 kN/m^2 and 92 kN/m^2. Using Table 21.3 from the Handbook of Geotechnical Investigation and Design Tables by Burt Look:

Table 21.3 Preliminary estimate of bearing capacity.

Material	*Description*	*Strength*		*Presumed bearing value (kPa)*
Clay	V. Soft	0–12 kPa		<25
	Soft	12–25 kPa		25–50
	Firm	25–50 kPa		50–100
	Stiff	50–100 kPa		100–200
	V. Stiff	100–200 kPa		200–400
	Hard	>200 kPa		>400
Sands*	V. Loose	D_r < 15%	$\phi < 0°$	<50
	Loose	D_r = 15–35%	$\phi = 30–35°$	50–100
	Med dense	D_r = 35–65%	$\phi = 35–40°$	100–300
	Dense	D_r = 65–85%	$\phi = 40–45°$	300–500
	V. dense	D_r > 85%	$\phi > 45°$	>500

a conservative allowable bearing capacity of 100 kN/m^2 can be adopted for the foundation solution.

It is noted that backfill operation was completed in 1946, as such the backfill has been in position for a considerable amount of time; in excess of 75 years, any consolidation settlement is more than likely to have ceased.

3 DEPTH OF MADE GROUND ENCOUNTERED

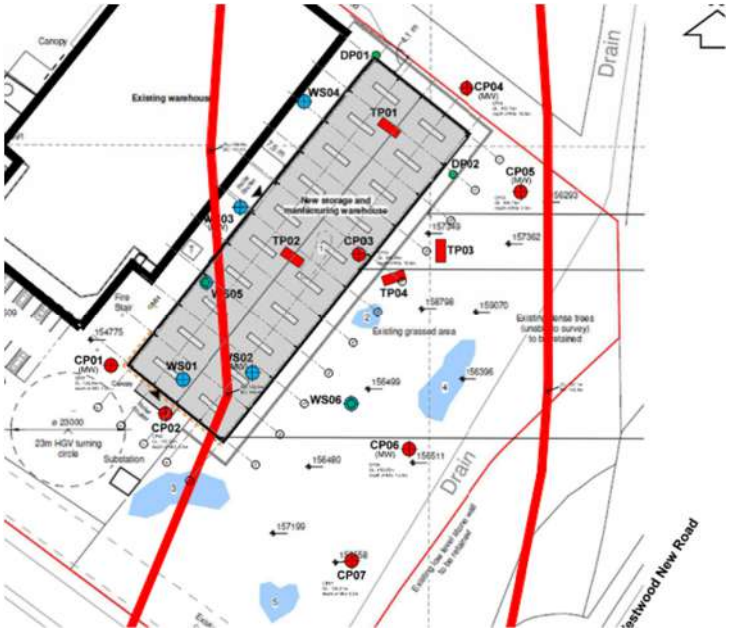
The depth of opencast backfill encountered varies across the site and summarised below

Borehole	Depth of made ground
CP01	7m
CP02	9m
CP03	10m
CP04	16m
CP05	4.5m
CP06	13.0m
CP07	6.0m

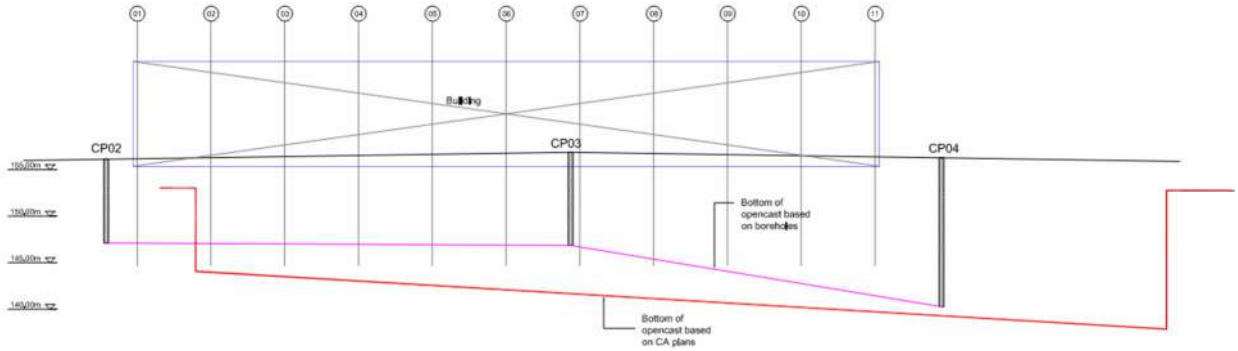
The recorded depth of made ground generally follows that of the depths expected based on the historical depths shown on the Coal Authority (CA) abandonment plans, with the following exceptions:

- CP01 and CP02 record depth of made ground of 7m and 9m respectively, whereas the CA plan states a depth of 3.1m should be expected. It may be that ground levels have been increased since the date of opencast infilling works as suggested by the varying description of the made ground in the borehole logs or that the borehole encountered internal opencast benching/high walls.
- CP05 records a depth of made ground of 4.5m, whereas the CA plan states a depth of 14.9 should be expected. This may be because the borehole did not penetrate the full depth of made ground or that the borehole encountered internal opencast benching/high walls.

The below image shows the CA opencast boundary overlaid onto the borehole location plan:



And the below image shows a long section through the centre of the building:

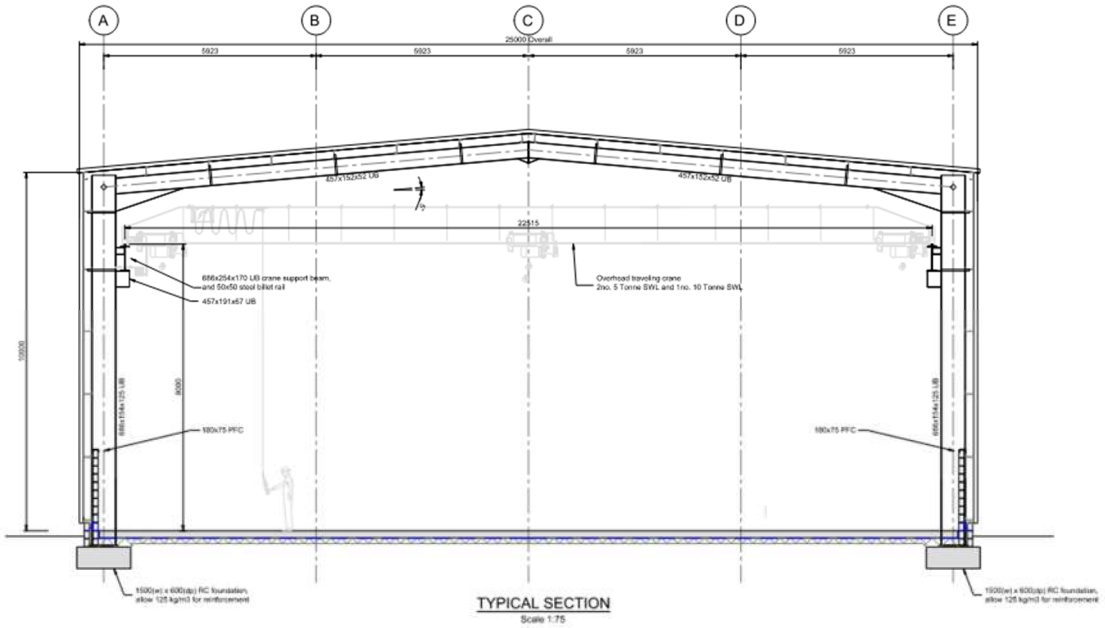


The magenta line shown in the above image shows the depth of made ground based on the results of the ground investigation, and the red line shows the expected depth of made ground based on the CA Plan.

The above review indicates that the proposed warehouse is to be located on ground comprising a significant depth of made ground, with depths varying between 7m and 16m. It is possible that internal opencast benching exists beneath the site as a whole, however based on the results of the ground investigation it is also possible that none exist directly below the footprint of the building and even if they did there is a considerable (minimum 7m) of made ground between the underside of the proposed foundations and the top of any benching.

4 PROPOSED WAREHOUSE STRUCTURE

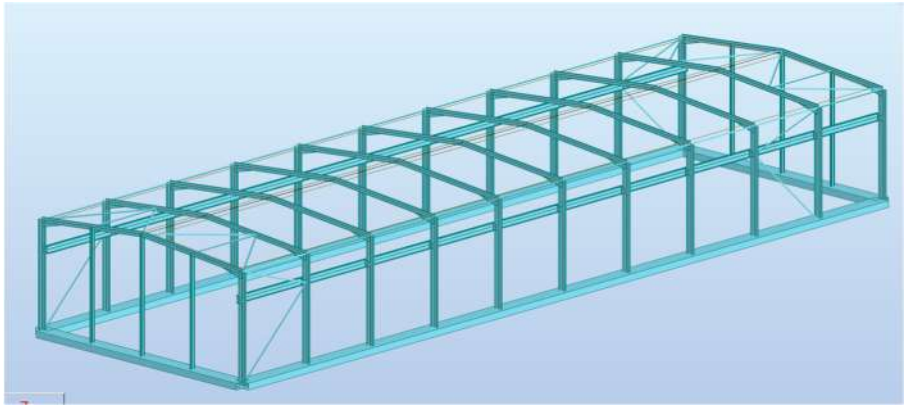
The proposed warehouse is to be constructed using a traditional lightweight steel framed building and clad in steel cladding, as indicated in the image below:



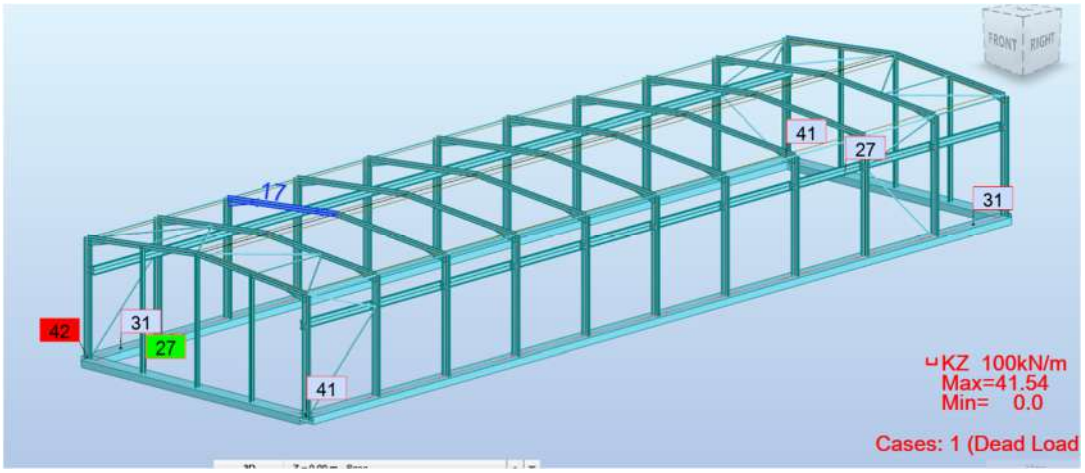
Taking into account that the building is founded on made ground it is proposed to support the structure on a foundation comprising a 'stiff' reinforced concrete ground beam which is continuous to the full perimeter of the building, a method of support commonly used for lightweight buildings founded onto made ground.

The 'stiff' foundation is continually supported on the ground and will regulate and control any differential settlement that may occur should there be any localised settlement removing the risk of any damage being caused to the building as a result of any settlement.

The 'stiff' foundation has been analysed using a 3d design software with the ground support modelled as a series of elastic springs to distribute the loads from the steelwork frame onto the ground. A sensitivity analysis using varying ground support has been undertaken to determine a worst-case forces envelope in the foundation to design the strength of the ground beam. The image below shows a view from the 3d analysis used:

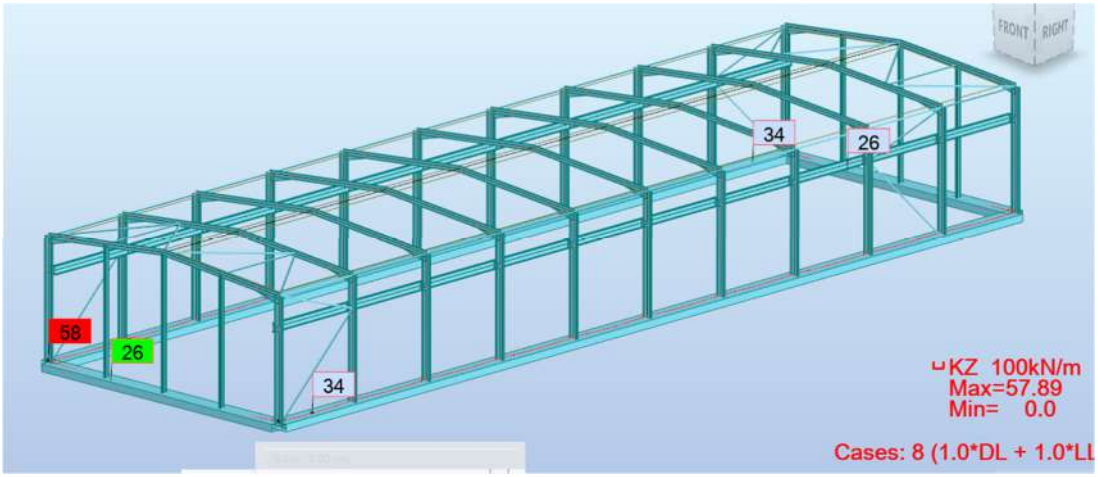


The analysis calculates that the applied ground pressure under the foundations under Dead/Permanent load is a maximum of 41 kN/m^2 as shown in the image below:



The foundation ground beam is proposed as being 1.5m wide and 600mm deep, the bulb of pressure below the foundations will remain well inside the depth of made ground above the level of any benching or high walls should they exist and therefore there is no increase in pressure acting at the change in depth of made ground at any benching or high walls.

The analysis shows that the applied ground bearing pressure under the foundation under Dead/permanent load and Live/variable load is a maximum of 58 kN/m^2.



The value of 58 kN/m^2 is less that the allowable ground bearing capacity of 100 kN/m^2 determined in section 2.

The ground floor slab is designed to support a live load of 25 kN/m^2 and is proposed as a ground bearing floor slab.

5 CONCLUSION

It is proposed to adopt a ground bearing solution to support the building.

Risks associated with any existing opencast benching or high walls has been accommodated in the design by adopting a ‘stiff’ reinforced concrete ground beam foundation, and establishing that due to the depth of made ground that the applied ground pressure from the building and any increase in ground pressure is contained wholly within the depth of made ground located above any benching or high walls should they exist.

The applied ground pressure from the building is demonstrated to be within the capacity provided by the made ground determined from in-situ testing undertaken during the ground investigation.