JACQUET UK LTD

ENGINEERING STATEMENT ON PROPOSED SUBSTRUCTURE SOLUTION

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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:

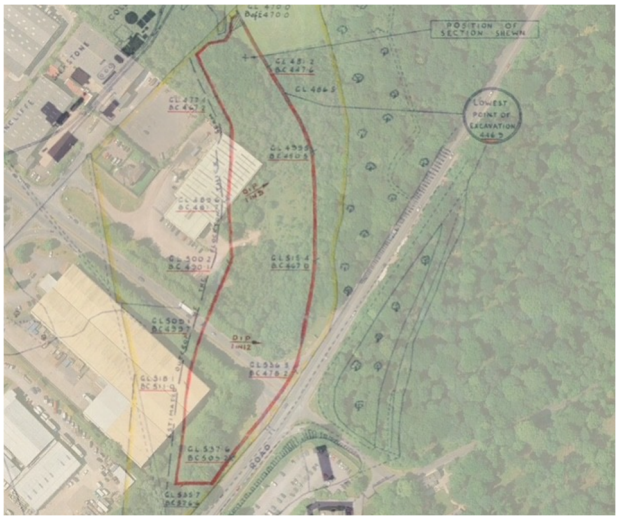


The existing facility comprises a multi storey office building with engineering workshop towards the rear. It is understood that the foundations to the existing buildings is ground bearing.

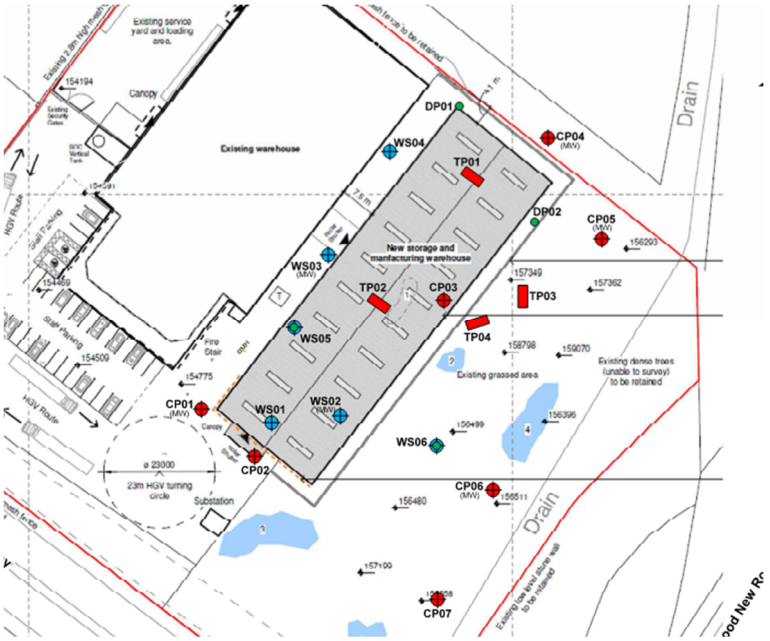
1.1 SITE HISTORY

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

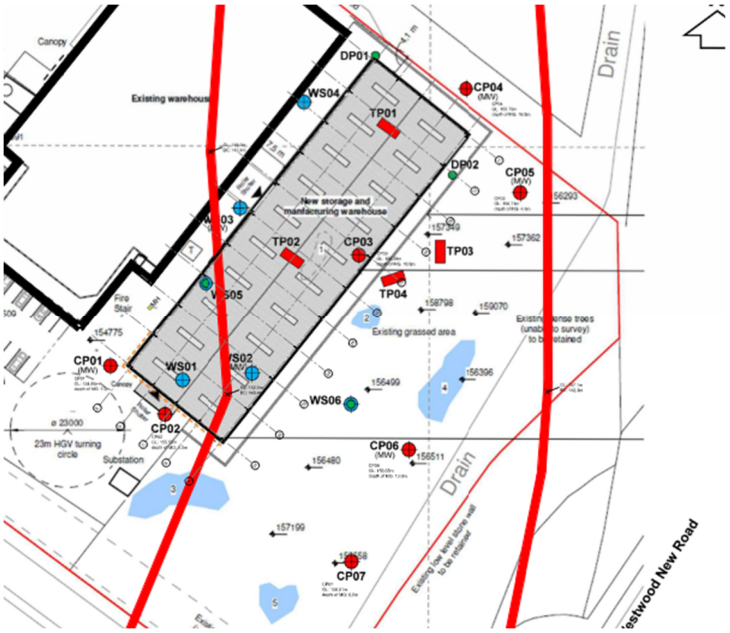
The depth of opencast backfill encountered varies across the site and summarised below

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

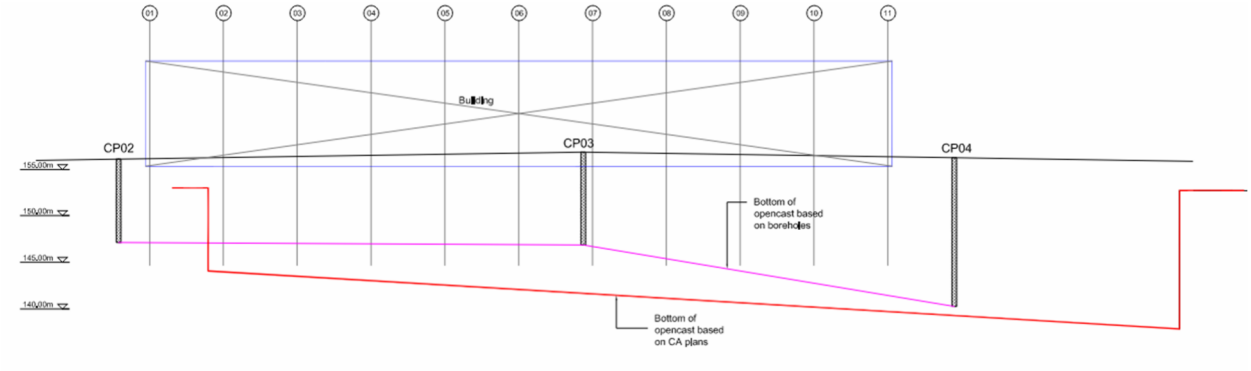
The recorded depth of made ground generally follows that of the depths expected based on the historical depths shown on the Coal Authority (CA) abandonment plans, with the following exceptions:

- 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:

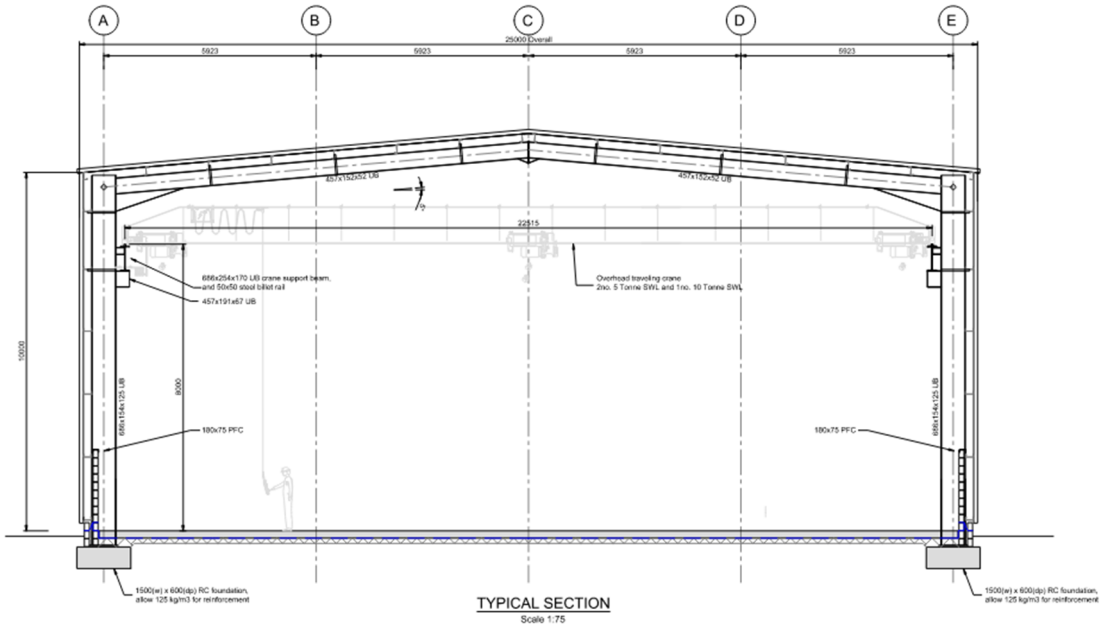


The magenta line shown in the above image shows the depth of made ground based on the results of the ground investigation, and the red line shows the expected depth of made ground based on the CA Plan.

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:

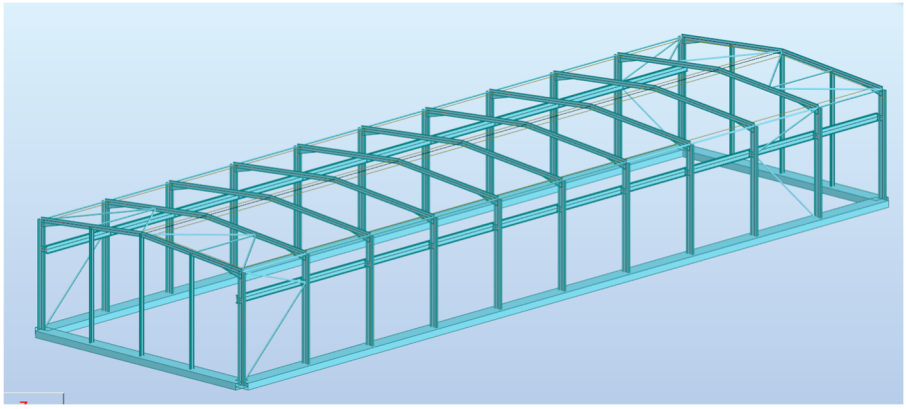


TYPICAL SECTION
Scale 1:75

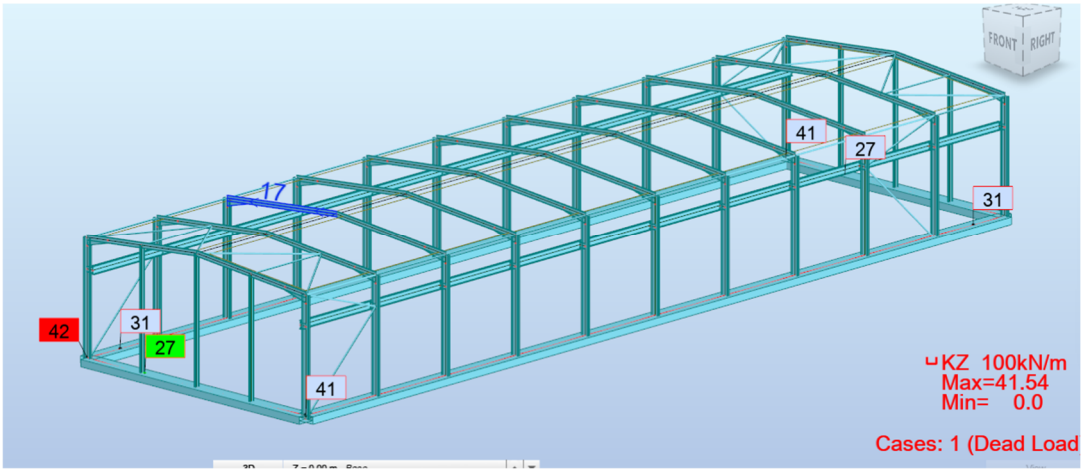
Taking into account that the building is founded on made ground it is proposed to support the structure on a foundation comprising a ‘stiff’ reinforced concrete ground beam which is continuous to the full perimeter of the building, a method of support commonly used for lightweight buildings founded onto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

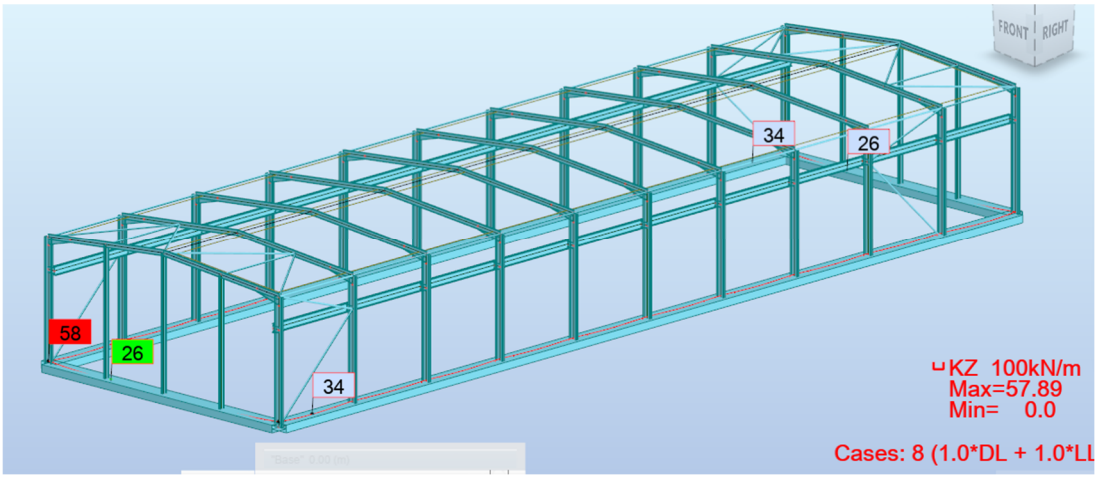


The analysis calculates that the applied ground pressure under the foundations under Dead/Permanent load is a maximum of 41 kN/m^2 as shown in the image below:



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.