beamconsulting

Our ref: 09-148-DOC003A

Date: 29th October 2021

Mr T Hanrey
Lidl Great Britain Ltd
Iport Unit 4
Ontario Drive
Doncaster
DN11 0BF

Dear Tom

Land at Centre 27, off Bankwood Way, Birstall, Batley
(Planning Application Ref: 2021/62/92528/E)
Ground Engineering and Contamination Mitigation Philosophy

We refer to the information submitted to date and supplement herein.

Project Purpose

The purpose of the project is to successfully remediate the previously used site which encompasses a number of below ground complexities, solve the issues with a pragmatic engineering approach following considerable evaluation involving professional support from a leading ground gas expert, and design of a stable development platform to facilitate the construction of two retail units with car parking. The planning submission includes a number of architectural and engineering drawings which illustrate the development project.

Ground Conditions

Delta Simons and Curtins have undertaken physical investigation works which document their findings. Summary findings of the associated reports indicate that the site is a former quarry with development having occurred on the site in one form or another since 1852 including quarrying, coal mine working, filling, construction of office buildings and their later demolition leaving the site in its current condition of at grade crushed demolition materials. Natural ground is present generally across the site at c15m below ground level with the 15m of fill comprising mixed type and quality of made ground including organic and inorganic waste. The need for investigation of coal mining legacy is identified in the Sirius Coal Mining Risk Assessment of 28th October 2021.

Key issues affecting the site are contamination, coal mining legacy, ground gas and the essential requirement of improving the ground from a bearing capacity perspective without taking below made ground to other unsustainable locations elsewhere.

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Third Party Assessment and overview of the findings and content of the various ground investigation reports has been undertaken by G B Card & Partners, the full detail of which is included in their letter report dated 11th December 2020 and their subsequent letter dated 29th October 2021.

Proposed Ground Engineering, Contamination and Gas Mitigation Measures

Foundations/Ground Engineering

The recommendations for foundations in the investigation reports postulate piling and ground improvement as possible techniques. The hardstandings across the site are required to be on more stable ground to minimise future surface level settlements. Taking the combined requirements of the foundations for the buildings and the stability requirements of surface level hardstandings it was determined that a holistic ground engineering approach should be taken. This philosophy has been developed to the extent indicated on Beam Consulting drawing numbers 09-148-200A, 09-148-403D and 09-148-404C. The philosophy is to establish the extent of coal mining legacy on the site, grout up the appropriate extent of coal mine workings, retain a significant proportion of the made ground in situ, improve the ground without using traditional piling by adopting advanced ground engineering techniques of Controlled and/or Bi-Modulus Columns (typically by Vibro Menard and other ground improvement specialists) with a load transfer mat (suitably graded stone layer) above to eliminate the potential risk of any upwardly migrating voids. Note is taken of the identified culvert in the east of the site which will remain below hardstandings. The proposed ground treatment will be designed to not negatively impact the culvert.

Contamination and Gas Mitigation Measures

It is considered that organic and inorganic contamination can be adequately mitigated against by adopting the ground engineering proposals presented on the drawings. Organic contamination is considered to be a low risk for the site due to the age of the organic fill. Inorganic contamination is considered to be adequately encapsulated within the 15m or so of ground improvement measures. The Curtins report notes gas levels of the site based on limited gas monitoring and in that respect recommends categorising the site as CS4 as per BS8485: 2015 + A1: 2019. This is considered as a conservative evaluation whereby additional gas monitoring could be undertaken which may have the beneficial effect of categorising the site as CS3. Pragmatically it is considered that the cost of such additional gas monitoring would be in excess of the potential nominal cost reduction in adopting slightly lesser gas mitigation measures, hence CS4 is to be adopted and is indicated in the indicative gas protection measures, foundation and ground slab details. This approach is supported by both the Sirius Coal Mining Risk Assessment and the G B Card & Partners letter of 29th October 2021.

Indicative Ground Engineering Scheme Proposals

It is recognised that economic ground engineering proposals are fundamental to the successful development of this site. In order to ensure that development risks, from a ground engineering perspective are adequately evaluated, G B Card and Partners were commissioned to undertake Third Party Assessment of the proposals prior to the scheme being worked up to planning submission standard. The G B Card and Partners letter report of 11th December 2021 provides this Assessment and is included in this document.

The following key documents in order of issue are relevant to the final ground engineering proposals and provide illustration of the proposals:

Geo-Environmental Assessment (Project No. 14-0672.03, dated 24 July 2018), by Delta Simons Environmental Consultants Limited
G B Card & Partners letter report dated 11th December 2020
Combined Phase 1 & Phase 2 Ground Investigation Report (Ref. 076893-CUR-00-XX-RP-GE-002-V02, dated 18 December 2020), Curtins Consulting Ltd
Technics Topographical Survey Drawing No 5038-1120-01 Rev B
Beam Consulting Engineers Drawing No 09-148-200A
Beam Consulting Engineers Drawing No 09-148-403D
Beam Consulting Engineers Drawing No 09-148-404C
Sirius Coal Mining Risk Assessment Rev B dated 28th October 2021
G B Card & Partners letter Rev 1 dated 29th October 2021
All current layout drawings supporting the planning application

Detailed Engineering Design of the Ground Engineering Scheme
The recommendations by G B Card and Partners as noted in their letter report dated 11th December 2020 will be adopted to finalise the detailed ground engineering design.

The ground improvement works will include but not be limited to making consideration of:

1. The profile of the Pennine Lower Coal Measures Formation varies significantly across short distances. The base of the columns will be designed to be installed with minimal deflection and with sufficient penetration into competent natural material around the edge of the former opencast workings, where interacting with the highwall.

2. It is noted that the waste is described as being within a clay matrix. The clay matrix will generally dominate the geotechnical engineering behaviour of the waste albeit variation will occur given the heterogeneity of the material composition. With landfilling at the site potentially continuing until the early 1990s, it is possible that any biodegradable putrescible materials in the waste are still degrading, albeit most of the degradation should have occurred over the past 30 years. Following improvement, the long-term residual degradation of landfill waste materials, resulting in potentially uneven loss of strength within the soil mass, should be considered. Where long-term settlement occurs within the waste mass, confirmation should be provided by the ground improvement specialist that any reduction of support and/or movement will not adversely affect the proposed solution, resulting in excessive movement or collapse of the stone column section.

3. It is acknowledged that anticipated total and differential settlements are to be reduced through the application of the proposed method. It is recommended that the design considers the transition between differing foundation types (CMCs/BMCs) to minimise potential differential movements and to maintain transition gradients within acceptable tolerances. It is anticipated the use of the load transfer mat will mitigate the majority of these potential effects.

4. The potential for ground gas migration, particularly within the vibro stone column element of the BMC columns, will be considered when designing the system. It may not be feasible to locate the base of the stone columns within the landfill waste material, encountered from

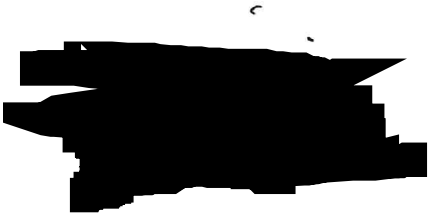
depths as shallow as 0.8m below ground level, which may mean varying the depth of the stone columns across the site. From a gassing perspective the site will be conservatively dealt as a category CS4 site.

5. The identified shallow mine workings are to be treated by injection grouting prior to ground improvement works taking place. The interaction between the treated mine workings, including the adit recorded in the East of the site, will be further investigated and defined to ensure the performance of the ground improvement works are not adversely affected.

6. Excessive heave will be mitigated against by reducing site levels slightly and adding the load distribution mat which will be supported by the columns below therefore not significantly increasing consolidation settlements.

If you require any further information in this respect please contact us.

Yours sincerely



K G Philip
Director

Documents referred to in this letter:

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- G B Card & Partners letter report dated 11th December 2020
- Combined Phase 1 & Phase 2 Ground Investigation Report (Ref. 076893-CUR-00-XX-RP-GE-002- V02, dated 18 December 2020), Curtins Consulting Ltd
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- Sirius Coal Mining Risk Assessment Rev B dated 28th October 2021
- G B Card & Partners letter Rev 1 dated 29th October 2021
- All current layout drawings supporting the planning application